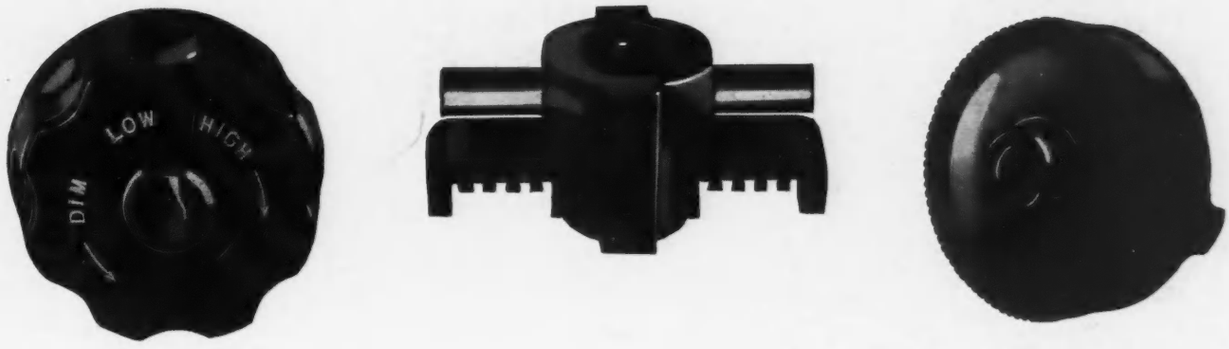
Dec. 1929

Electrical Manufacturing

Vol. 4 A Gage Publication No. 6



Your Pick in Molded Parts

GO back to original sources and start there. Pick a molding service that *is doing* the sort of work you want, the *way you want it done.*

In International molding service you will find what you are looking for. A service equipped by experience, facilities and large-scale steady production to take your order with the least effort and the most enthusiasm.

You will obtain the full advantage of best technical skill, most modern equipment, expert operators, and efficiently managed production system. When your first new parts are laid before you, there will be no question of their being right, to the most minute detail. And they'll all come through the same way — perfectly made and promptly delivered.

International molding service includes everything in the molding picture. Your responsibility ends with the delivery of your blueprints and specifications. We make your molds, manufacture all metal inserts, assemble and mold, all on one order. All in our own extensive plant, under best conditions. Our estimators are at your service without obligation.

PRECISION MOLDERS OF BAKELITE AND OTHER PLASTIC MATERIALS

INTERNATIONAL INSULATING DIVISION
The General Industries Company
ESTABLISHED 1875 · · ELYRIA, OHIO

YOU CAN HAMMER THE BELDEN SOFT RUBBER PLUG- IT WONT BREAK
Reg. U. S. Pat. Off.
Belden Soft Rubber Connector on Breuer Portable Blower. Use of connector as illustrated eliminates severe wear at point where cord leaves appliance. Also provides for convenient storage of blower apart from cord—a very popular feature with users.

A Soft Rubber Connector
As unbreakable as the
Belden Soft Rubber Plug

NOW manufacturers can forget connector problems, too!

Just as the Belden Soft Rubber Plug has solved the plug breakage problem, the Belden Soft Rubber Connector has made unnecessary the complaints, ill will, and costly servicing that are caused by broken connectors.

"By adopting the Belden All-Rubber Extension Link with Soft Rubber Connector and Soft Rubber Plug, we have eliminated breakage," writes A. A. Breuer, of the Breuer Electric Manufacturing Company, Chicago, "thereby saving time, money, and inconvenience for us and our customers, as well as doing away with troublesome replacements."

These unbreakable Soft Rubber Connectors and Soft Rubber Plugs can be furnished as a part of the Belden Cut Cord Service on cords in a variety of sizes and insulations (including textile as well as all-rubber) lengths to your specifications.

Send cord specifications and sample will be furnished.

BELDEN PRODUCTS

Beldenamel and Textile Magnet Wire
Coil Windings
Beldenmold
(Molded Bakelite Products)
Automotive Wires and Cables
Airplane Assemblies
Radio Wires, Cords and Cables
Rubber Covered Wires
Armored Cables
Flexible Armature Wires
Motor Lead Wires
Braided and Stranded Copper Cables
Cotton Sleeving

Belden Manufacturing Company

2310-B South Western Ave. **Chicago, Ill.**

Specify Belden

12761

Good Products *deserve* Good Motors

Manufacturers of motor-driven products stake their reputation on the motors they use. If these motors fail to function *at any time* or under *any conditions* . . . . the entire appliance gets the blame.

On the other hand, motors that perform perfectly, under even adverse conditions, greatly enhance the product's reputation. An ever-increasing number of prominent manufacturers *continue* to equip their products with Master Guaranteed Motors because:

Master Motors do not overheat—are well insulated—have sealed bearings and a simplicity of construction that makes for long life.

They have large starting and overload capacities—an ample reserve for emergencies.

They start and operate rated loads on voltages well below normal—in many cases as low as *70 per cent.*

They will operate for long periods without attention, due to improved bearing construction and lubrication.

We will welcome an early opportunity to tell you all about Master Guaranteed Motors.

The Master Electric Company
DAYTON, OHIO

STOCKS CARRIED IN PRINCIPAL CITIES

More Than 100 Service Stations

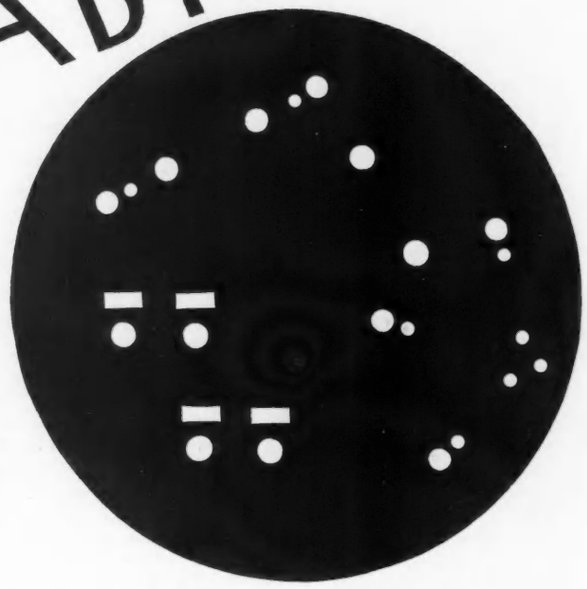
MASTER GUARANTEED MOTORS

1/20 TO 10 H.P.

Dayton
THE MASTER ELECTRIC CO.
Ohio

not more than 40°

The UTMOST in PUNCHABILITY



When punching stock is under discussion nothing is mentioned that punches better than the Formica cold punching grade.

This material also combines with easy punchability, very good insulating characteristics.

Furthermore the material is available in a handsome brown color that gives it the best of appearance.

The Formica laboratory works constantly to improve the material - - - and distinct steps forward are occasionally accomplished.

This punching stock is one of them. Send for a Sample or if you want us to punch the parts, send your blue prints for a price.

THE FORMICA INSULATION COMPANY
4638 Spring Grove Avenue Cincinnati, Ohio

FORMICA
Made from Anhydrous Bakelite Resins
SHEETS TUBES RODS

Electrical Manufacturing

Reg. U. S. Patent Office

Volume 4 | DECEMBER, 1929 | Number 6

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ELECTRICAL MANUFACTURING'S editorial program has the following objectives:

Production

To help all electrical manufacturers, including makers of motor-driven products, increase the product's salability, cut unit production costs, quicken turnover, reduce overhead expenses, establish standard methods of work, and spread a better knowledge of raw materials and parts.

Marketing

To spread a better knowledge of and aid electrical manufacturers in adjusting sales management to the buyers' market, to aid in making advertising more effective, finding the most profitable distribution channels, and promoting cooperative market development.

Administration

To further the working out of sounder management policies and better executive control, coordinating sales and production schedules, promoting research, and developing better industry relations.

Repairing

To help all motor repair shops to build better business by developing a sounder organization, improving management, policies and methods, and developing a keener merchandising point-of-view on the business.

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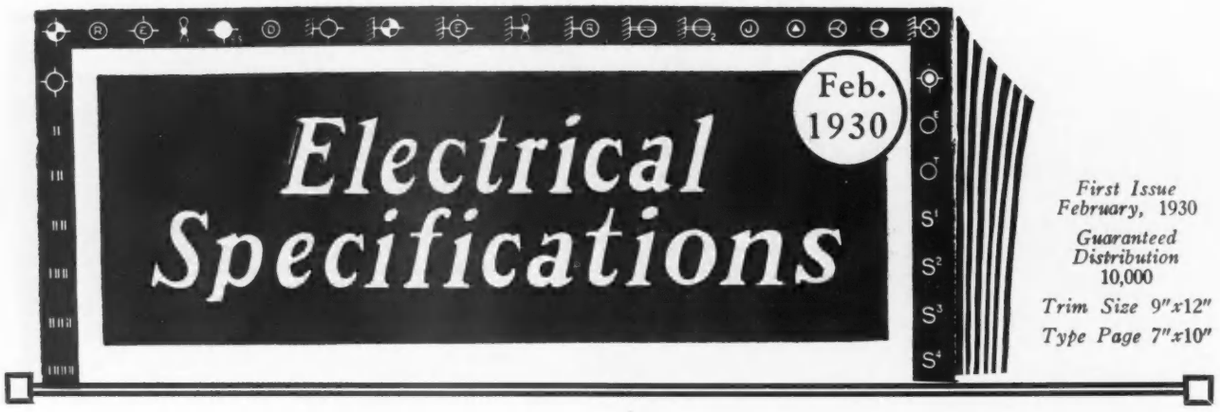
AN electrical job to be done among ARCHITECTS, ELECTRICAL ENGINEERS, BUILDERS *and* ELECTRICAL INSPECTORS...one that the industry has not done for itself...



First Issue
February, 1930
Guaranteed Distribution
10,000
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Gage believes that there exists a vital problem today in the intelligent and adequate specification of electrical products in building construction. It is an electrical job. Nothing, however, has been done to sell the basic electrical idea to these groups through a permanent, concerted and vigorous campaign of education and persuasion.

With a responsibility to the electrical industry, of which it has so long been a part, the Gage Company undertakes to weld these groups together in their electrical thinking in the planning of building construction.

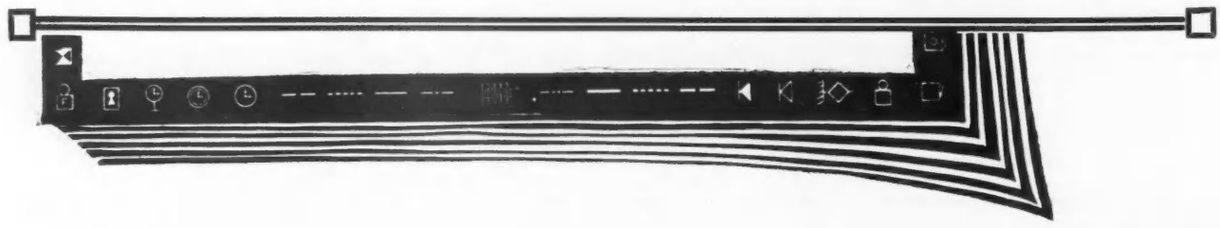
We will arouse them to the vital importance of the electrical system of a building. We will show them by word and illustration what constitutes modern practice in electrical installations in every kind of building. Code and Underwriters' requirements will be interpreted to them.

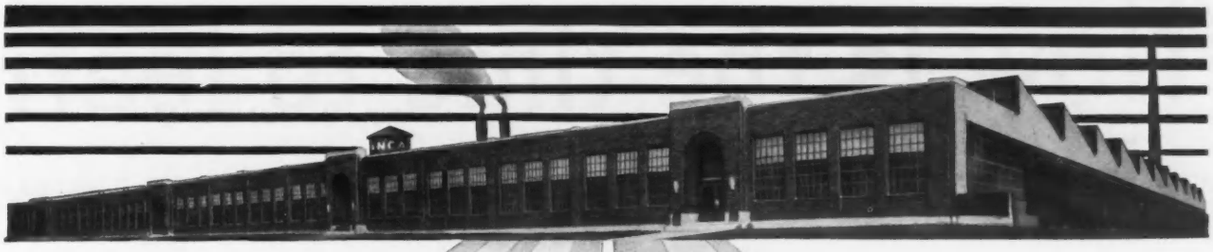
In short, we will give them an electrical viewpoint in their specifying and influencing. This burden need no longer be borne by the individual manufacturer, to reap, at best, but a singleness of return from his complex efforts. Gage will function for the whole electrical industry; educating, cultivating and selling the groups on the broad electrical idea.

Before deciding upon the 1930 program, look into the possibilities offered you by ELECTRICAL SPECIFICATIONS.

THE GAGE PUBLISHING COMPANY, INC., 461 Eighth Avenue, New York, N. Y.
Publishers to the Electrical Industry Since 1892

ELECTRICAL RECORD - ELECTRICAL MANUFACTURING - ELECTRICAL SPECIFICATIONS
METROPOLITAN ELECTRICAL NEWS - GAGE LIST OF ELECTRICAL BUYERS





Large addition trebling plant capacity under construction

INCA

A REMARKABLE RECORD!

GREAT FACTORY COMPLETED
PRODUCTION AT FULL SPEED
EXPANSION NOW UNDER WAY
WILL TREBLE PLANT CAPACITY

A MAMMOTH plant under full power of production. New machinery and equipment built exclusively for the specialized needs of the industry. Copper wire products for the radio, electrical and automotive fields manufactured with consummate skill — under management and engineering seasoned by years of experience.

That's the story of INCA — just 80 days after the first shovel of dirt was turned for the new factory. It is likely that this record, indicating as it does, matchless ability of performance, is unexcelled in industrial history.

And now comes the announcement of the construction of an addition to the factory, giving floor space and facilities that will treble INCA'S capacity of output! This tremendous expansion is possible because of the exacting and courteous service already given those who have placed their confidence in INCA — growth which competently invites the increasing demands of the trade.

Founded by GEO. A. JACOBS *and Associates*

INCA

INCA: *Symbolic of the best in the copper wire industry*

INCA MANUFACTURING CORPORATION

COPPER WIRE PRODUCTS
FORT WAYNE, INDIANA

EASTERN OFFICE: NEWARK, NEW JERSEY + INDUSTRIAL OFFICE BLDG.

Now is the time to learn about G-E Glyptal lacquers

GENERAL ELECTRIC GLYPTAL lacquers should be considered not alone for the unexcelled tenacity with which they stick to all surfaces, but also for their remarkable resistance to extremely high temperatures. Such temperatures neither detract from their adhesive qualities nor impair the protection they afford.

Moreover, G-E GLYPTAL lacquers are time-saving, money-saving finishes. They eliminate priming and sizing operations in the finishing of metal surfaces. G-E No. 1451 filler, recommended for use with GLYPTAL lacquers, possesses priming characteristics. The lacquers themselves function as both primer and sizer.

G-E GLYPTAL lacquers are now available in five colors: red, blue, green, brown, and aluminum—other colors to follow. Essentially, all have the same desirable characteristics. Besides preventing rust, they resist alkalies, weak acids, salt spray, mineral oils, gasoline, and kerosene; and they have high dielectric strength.

G-E GLYPTAL lacquers are applied by spraying, dipping, or brushing; air-dry quickly; and form smooth, tough, yet flexible finishes. Baking somewhat prolongs their distinctive qualities. Let the G-E Merchandise Distributor nearest you explain more about G-E GLYPTAL lacquers. If you prefer, fill in and mail the coupon.

WRITE FOR *folder*

Merchandise Department,
General Electric Company,
Bridgeport, Conn.
Gentlemen:
I wish to make my own experiments. Please send more detailed information about these new protective finishes.

_____

_____

Section I- _____

800-528

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

GLYPTAL LACQUERS

REG. U.S. PAT. OFF.

CASTINGS

62% Lighter than Iron WITH THE ADVANTAGES OF IRON

Here is the 20th Century practice in castings. Lighter—stronger—more powerful.

Why continue the old style heavy metal castings which are often a drawback in production—shipping—in selling?

Bohnalite is the new light alloy which is replacing iron in so many industries.

In transportation units it cuts dead loads and increases pay loads.

Bohnalite has the advantages of iron with none of its disadvantages. It has a high uniform hardness—great density—fine grained structure—excellent bearing qualities—exceptional strength and ductility.

Send your samples and blue prints today for quotations.

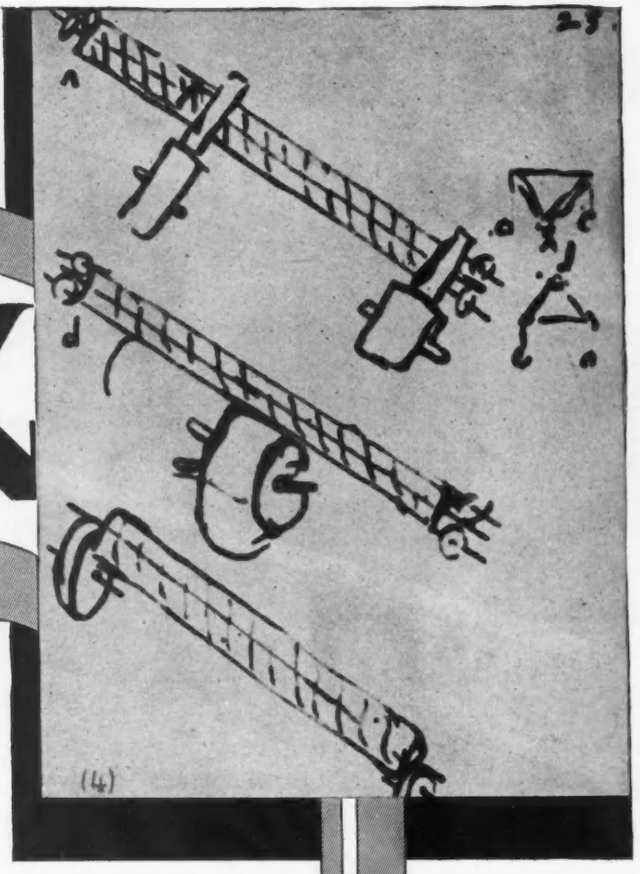
Write for interesting booklet showing the wide use of Bohnalite in a great variety of industries.

BOHN ALUMINUM & BRASS CORP., DETROIT, MICHIGAN
New York Chicago Philadelphia Cleveland Pittsburgh

CHAS. B. BOHN
The authority who developed Bohnalite

BOHNALITE 62% Lighter than Iron

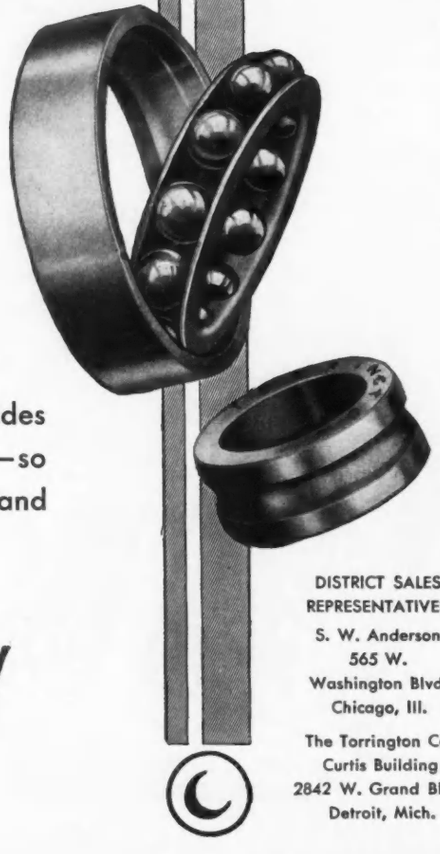
The WORLD FIGHTS FRICTION



THE fame of Leonardo da Vinci as an artist of rare ability needs no recounting. But da Vinci also was a genius in the realm of science. He was the first to establish the differences which exist between the friction between solids and the friction between liquids. Also he distinguished between sliding friction and pivot friction. He even went to the point of working out a coefficient of friction, which he gives as 0.25—probably for friction upon wood. But da Vinci went further through the invention of pivots and roller bearings of great perfection. His scientific mind would have applauded today's anti-friction device, the ball bearing.

THE force of friction is overcome by a greater force—Torrington Ball Bearings. So machines with Torrington installations are scientifically equipped to give smooth, trouble-free service.

Torrington has put the skill and experience of decades of precision manufacture into these ball bearings—so Torrington Ball Bearings conform to high engineering and machine-user standards.

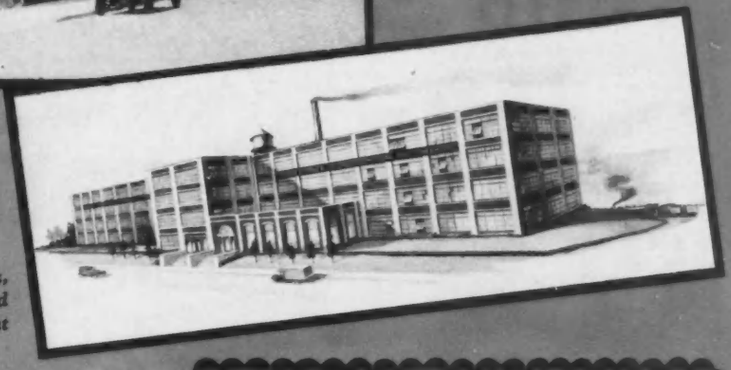


The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.

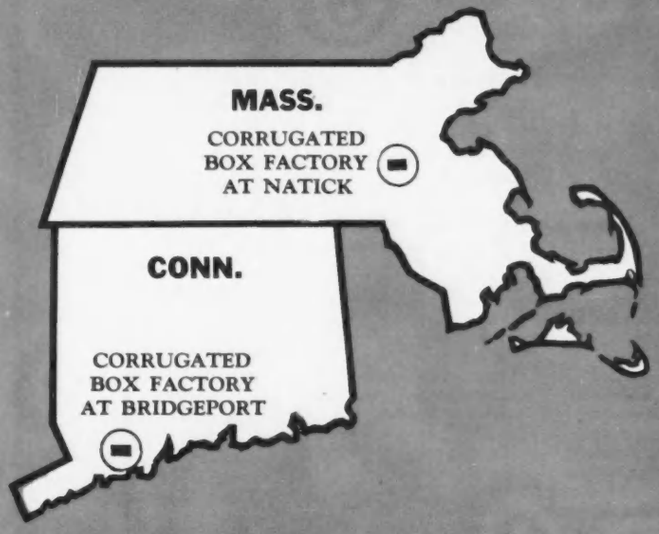
DISTRICT SALES REPRESENTATIVES
S. W. Anderson
565 W.
Washington Blvd.
Chicago, Ill.

The Torrington Co.
Curtis Building
2842 W. Grand Blvd.
Detroit, Mich.

Left—Our corrugated box plant at Bridgeport, Conn. —an asset to New England shippers.



Our corrugated box plant at Natick, Mass., was formerly the Corrugated Paper Mills, well known throughout New England.



THE HOME OF DEPENDABLE CORRUGATED SHIPPING CONTAINERS

[Exhibit No. 6 of a Series]

CORRUGATED BOX FACTORIES

of the

CONTAINER CORPORATION OF AMERICA

and MID-WEST BOX COMPANY

in Massachusetts *and* Connecticut

ONE of the latest additions to the large Container Corporation family is the Corrugated Paper Mills at Natick, Mass., well known throughout New England. The former clientele of this modern plant are assured of the highest quality corrugated shipping containers and products under Container Corporation supervision and direction and its strategic location near Boston permits a satisfactory handling of all orders.

Our corrugated plant at Bridgeport, Conn. was inaugurated at about the same time in 1928 and is now equipped to handle customers' requirements for dependable corrugated boxes in record time.

Both the Natick and Bridgeport plants include among their equipment the latest refinements in corrugated box manufacture which tend to reduce cost and increase quality.

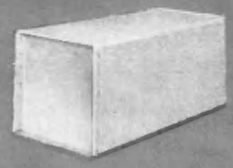
These plants serve the same general territory—the New England States.

OTHER FACTORIES AND MILLS

at Chicago, Anderson, Ind., Kokomo, Ind., Cleveland, Cincinnati, Circleville, O., Fairmont and Charleston, W. Va. and Philadelphia.

HAVE BEEN FEATURED IN PREVIOUS INSERTS

A Great Variety of Goods — Fragile, Solid *and* Liquid Now Packed in Fibre Board Containers


Pilferproof Recessed End Shipping Box

Matches

Shoes

Tobacco, Cigars Cigarettes

Opera Chairs

Everything in Cans

Reshipping Case for Bottles and Bottled Goods

Toys — All Kinds

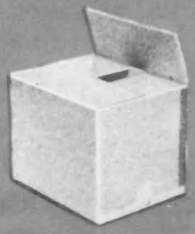
Lamp Wrappers

Electric Light Bulbs

Dry Cell Batteries

Soaps, Washing Powders and Flakes

Milk, Preserves, Etc.


Slotted Carton for all Commodities

We Are Anxious to Please Customers Through Service

INDUSTRY in the United States speeds up each year. As progressive manufacturers reach out for new records in production and lower costs, quick service from suppliers becomes a necessity. In order to meet this high-speed program we have built up a strong chain of factories located in industrial centers and equipped to handle quickly all orders for corrugated or solid fibre products and boxboards.

We recognize service as an effective builder of prestige and good will and through this chain of plants we are seriously striving to refine our service and please our customers.

May we help you with your packing and shipping problems? Simply fill in and mail COUPON below.

Some Industries Now Using Our Solid Fibre or Corrugated Boxes

Bakery Goods
Canners
Building Material
Sporting Goods
Books and Magazines
Toys
Crockery
Bottlers
Fruit Packing
Radio Goods
Pictures
Vegetable Growers
Meat Packing
Dairy Goods
Soaps and Chips and Washing Powders
Matches
Furniture
Stationery
Lamps and Shades
Tobacco—all forms
Perfumery
Paints and Varnishes
Automotive
Glassware
Insecticides
Rubber Goods
Electrical Goods
Men's, Women's and Children's Furnishings
Millinery
Confectionery
Carpets and Rugs
Shoes
Breakfast Foods
Proprietary Remedies
Spices
Foods—All Kinds
Instruments
Brooms, Brushes, Etc.
Ceramics
Leather Goods
Doors
Hardware
Dry Cell Batteries
Enamelware
Filing Cabinets
Electric Light Bulbs

CONTAINER CORPORATION OF AMERICA
and MID-WEST BOX COMPANY

111 W. Washington Street Chicago, Illinois

Six Mills—Twelve Factories—Capacity over 1200 tons per day

RETURN COUPON

CONTAINER CORPORATION OF AMERICA
111 West Washington Street, Chicago

Gentlemen: Please have one of your experts check our present packing and shipping methods—without obligating us—for the purpose of reducing our costs if possible.

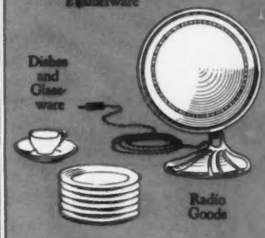
Name_____

Title_____

Firm_____

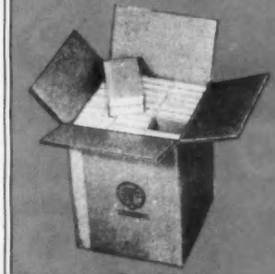
Address_____

Pottery and Enamelware

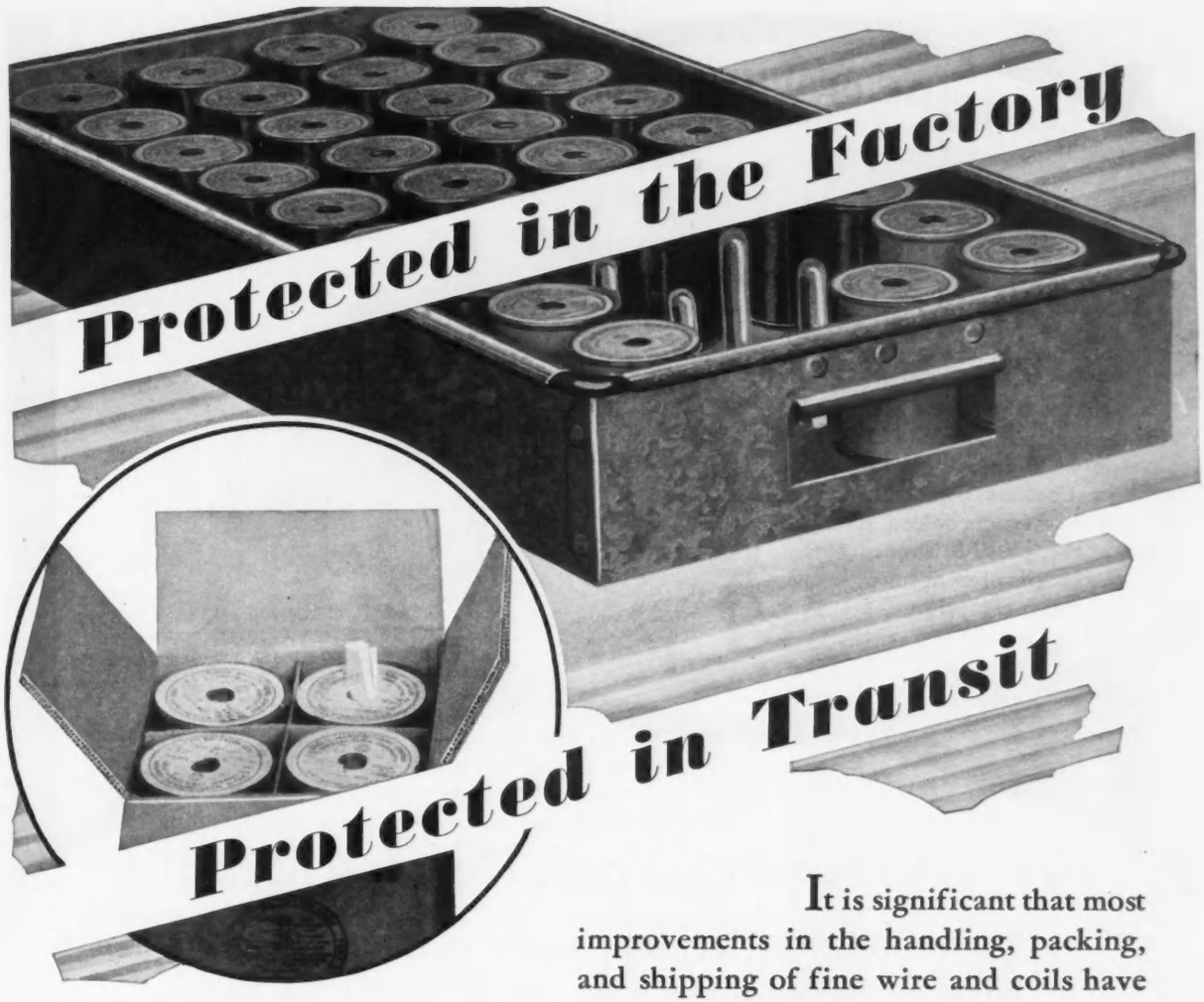

Dishes and Glassware
Radio Goods

Electrical Goods

Reflectors


Enameled Tile

Wherever goods are manufactured — there you will find our boxes reducing packing and shipping costs.



Factory trays fitted with vertical pegs protect the spools from contact with each other, thus preventing any possibility of damage to the insulation. These trays are another Dudlo development.

Spools are shipped in double-strength boxes, and are separated by heavy fibre-board partitions forming an individual compartment for each tier. No possibility of damage in transit.

It is significant that most improvements in the handling, packing, and shipping of fine wire and coils have found their origin in the Dudlo plant.

The final buyer of your product wants quality. With this end in view, it is our purpose to see that your wire arrives in perfect condition. No precaution on Dudlo's part is too painstaking when your interests as a manufacturer are involved.

Dudlo handling and packing methods are just *one more reason* why Dudlo wire is the choice of the country's leading manufacturers.

DUDLO

DUDLO MANUFACTURING COMPANY, FORT WAYNE, INDIANA

Division of General Cable Corporation

WHERE UDYLITE BEAUTIFIES AND PROTECTS

U

Safeguarding fine Radio Reception

There is no greater tribute to the Udylite Process than the fact that it is widely employed in the radio industry. Udylite not only beautifies, but protects the meticulous workmanship and finely synchronized parts that make possible the excellence of present day radio reception.

In Every Industry Where Rust is a Menace

The manufacturer of today knows that his responsibility no longer ceases when his product leaves the shipping room. No matter how highly skilled the workmanship may be, no matter how fine the materials, he has learned that the menace of rust must be combated. The automotive, airplane, railroad, marine, and scores of other industries are finding that the most successful solution to the rust proof problem lies in the Udylite Process. Write us for specific information relative to your industry.

The UDYLITE PROCESS COMPANY

Eastern Sales Office: 30 East 42nd St., New York

3220 Bellevue Avenue DETROIT, MICH.

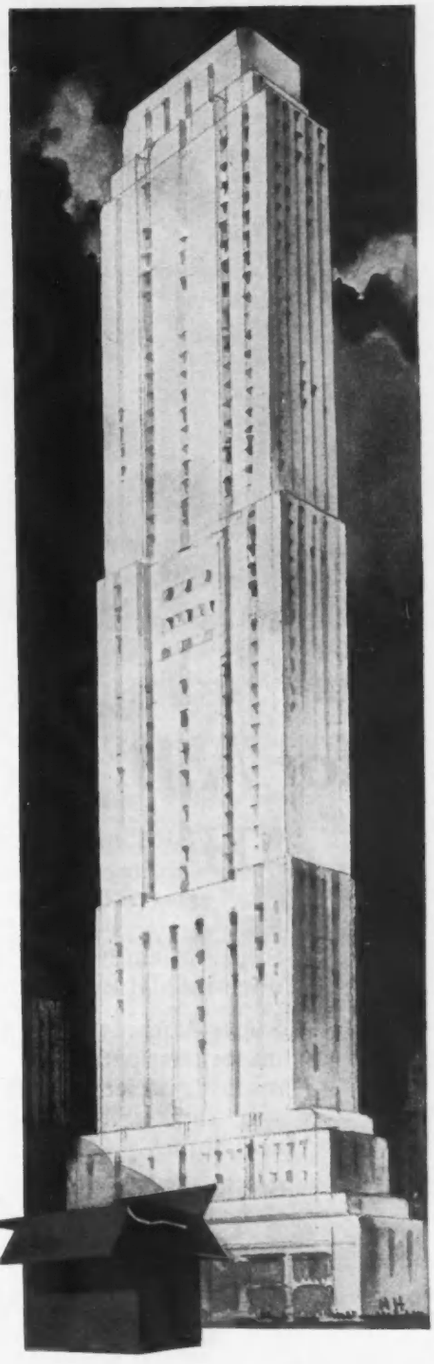
Western Sales Office: 114 Sansome St., San Francisco, Ca.

Udylite RUST PROOFS

TO DESIGN A MODERN SKYSCRAPER—
only a Skilled Architect

Building a modern skyscraper involves more than the laying up of brick or stone according to desired appearance, floor space and height. Designs must be created, plans carefully worked out and specifications accurately calculated to insure due strength and permanence without excessive weight or cost of materials.

Only to a skilled architect can such an important job be entrusted with confidence—his training and experience are absolutely vital.



To Design the right . . . CONTAINER
only a Package Engineer

In the proper designing of a shipping container more must be considered than mere shape and dimensions. Shipping weight, packing room labor costs, storage necessities, merchandising requirements, ample protection without excessive cost—these are all factors to be dealt with.

50 H & D Package Engineers are daily solving complex shipping container problems for a widely diversified range of products. Their experience and skill have saved thousands of dollars for shippers everywhere. Their recommendations are scientific, sound and practical.

The services of these men—backed by the resources of the world's largest corrugated fibre box making organization—are available to you without charge or obligation. If you have a packaging problem—send for an H & D Package Engineer.

The coupon below will bring you a copy of the latest H & D booklet on scientific packaging in your industry.

THE
HINDE & DAUCH PAPER CO.
325 Decatur Street Sandusky, Ohio

HINDE & DAUCH *corrugated fibre* SHIPPING BOXES

H&D

THE HINDE & DAUCH PAPER CO., 325 Decatur St., Sandusky, Ohio
Please send a copy of "How to Pack It" to

Name .....

Address .....

Town .....

We are interested in packing .....

SUPER-MICANITE RINGS AND SEGMENTS

for A.B. See Elevator motors

HERE in the heart of an elevator Super-Micanite plays an important part in assuring smooth, uninterrupted service. High dielectric strength and low surface leakage so essential for this service, are characteristics of Super-Micanite that are unequalled in any other built up mica insulation.

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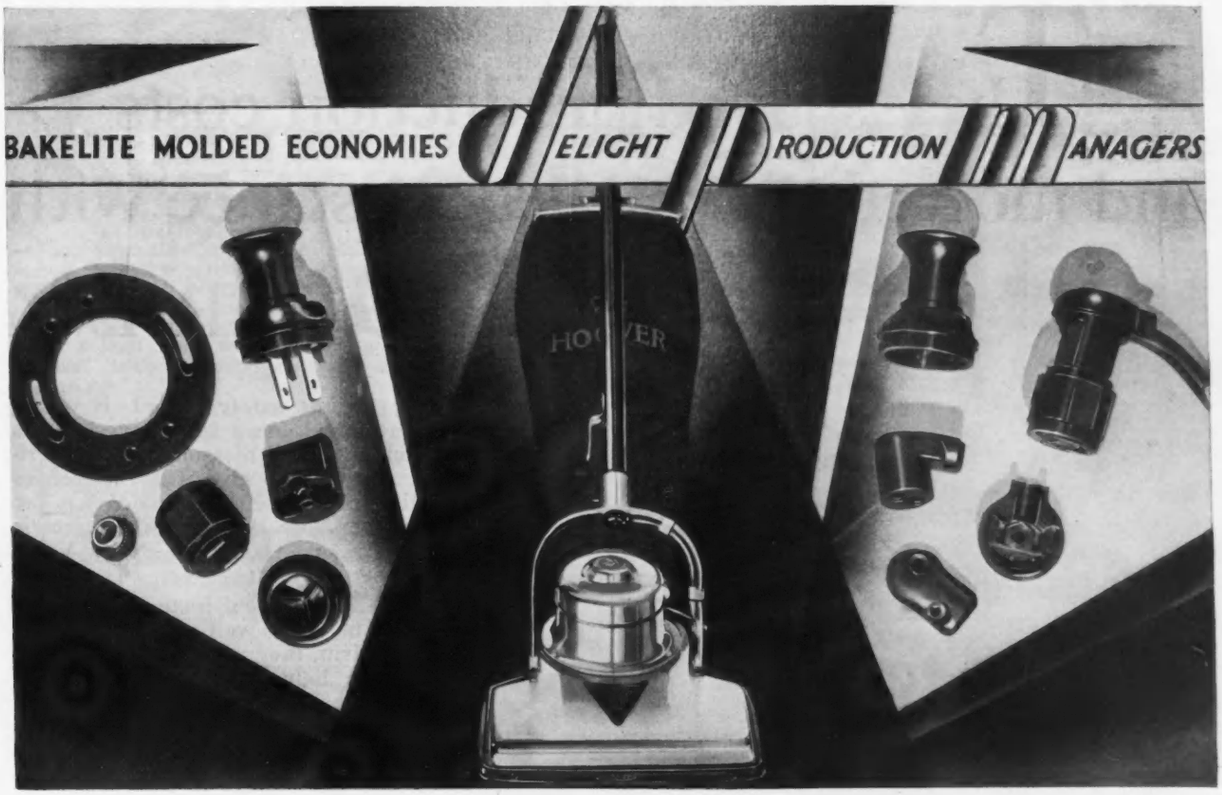

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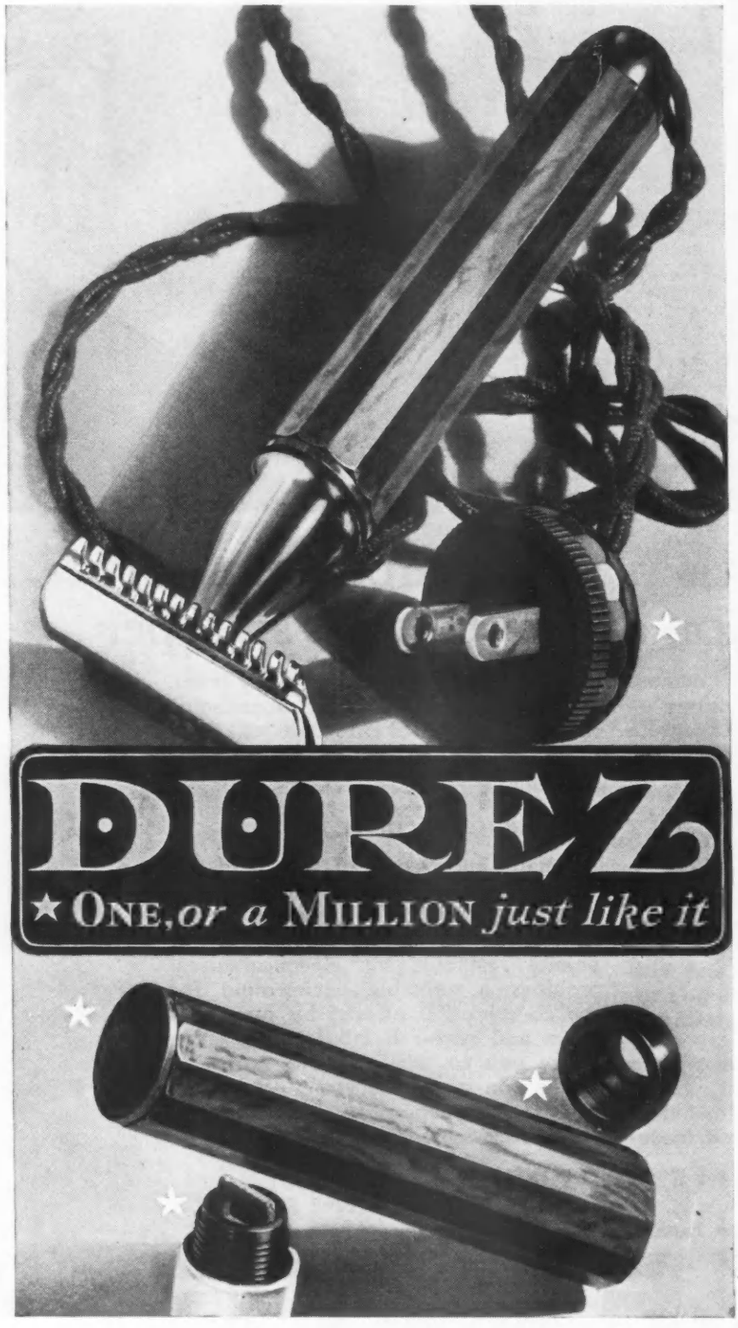
They shaved production costs and mowed down sales resistance with DUREZ



AN ELECTRIC safety razor! It was a great idea! And inventive genius quickly made it blossom into a practical reality! To give it attractiveness and a reasonable selling price was the next step. Its sponsors, the Electric Razor Corporation, of New York, soon settled that:

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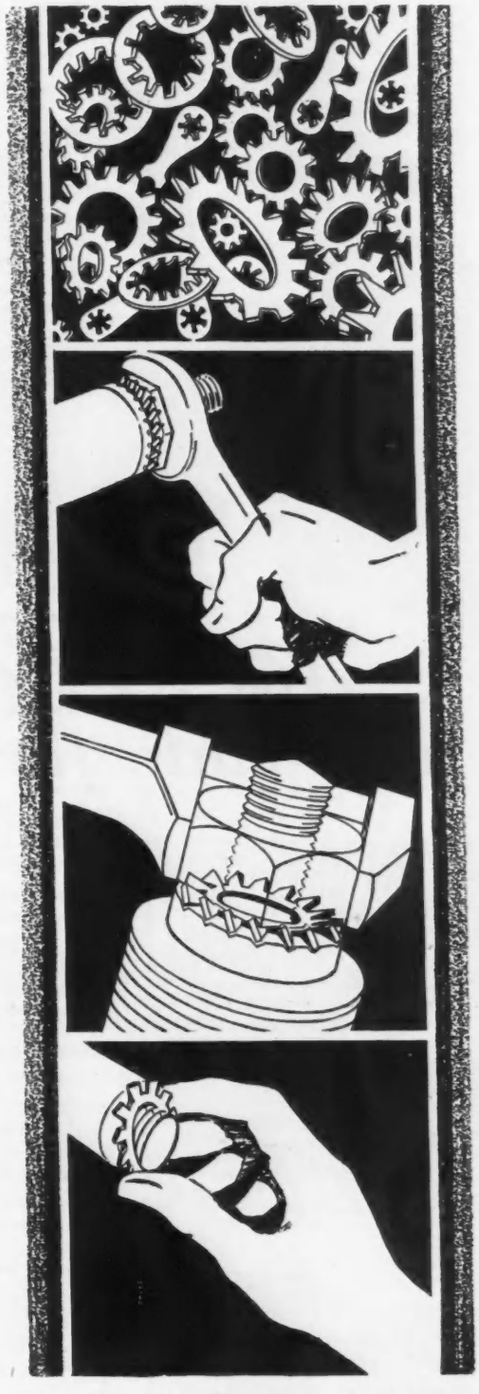

Type 20 Terminal

Type 12 Internal

Type 20 Terminal

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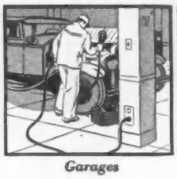
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Electrical Manufacturing

Production - Marketing - Administration - Repairing

Volume 4 DECEMBER - 1929 Number 6

Shunting Resistance in the Human Circuit

As Told to
CHAPIN HOSKINS

PERHAPS your own plant is free from the doubts and perplexities which frequently exist between the members of the different departments of a manufacturing organization. Some plants are. But if they are it is because something has been done about it.

Let any electrical manufacturing organization grow beyond the point of one straw boss and one small gang of men and there is room for doubt and confusion, friction and jealousy. This constitutes nothing short of a resistance in the human circuit.

And once let it reach the stage where it becomes departmentalized, or develops a line and staff organization, and it will never be a completely coordinated unit—unless special steps are taken to make it so.

You wouldn't expect a motor to operate with its minimum of virbration and friction unless you watched out for both vibration and friction in designing and in maintaining it. Yet that human motor which we call a manufacturing organization is far more subject to both of these undesirable qualities.

A human organization has one advantage, though. Given a chance, it can polish its own bearings and generate its own lubricant.

An electrical company which has proved this rather definitely in the last year and a half is Ward Leonard Electric Company, of Mt. Vernon, N. Y. In this company's manufacturing organization a rather remarkable experiment has been carried out, with excellent results.

During the winter of 1928 a series of foremanship development meetings was being held at the company's plant, under the general direction of Glenn Gardiner.

These meetings were working toward the end of developing in the foremen a clearer and more systematic conception of their own work with particular reference to quality of the product, reduction of waste, prevention of accidents, and the maintaining of a smooth flow of production.

As the foremen developed through these meetings a

The Proof of the Pudding

Statements made by individual members of the groups in the Ward Leonard plant as to some of the worthwhile advantages of the meetings to them

¶ If a man learns and practices even a small fraction of the ideas brought out, it is time well spent.

¶ There is less friction between departments now that we know each other better and we can cooperate more.

¶ I've learned more in these six months of meetings than in all the rest of my thirteen years with the company.

¶ There are two fellows here in this group that I always had trouble with until we got together in these meetings.

¶ I've watched to see what the effect would be and I am positive that there is more cooperation than ever before.

¶ I can point to several things that came up in the meetings and got immediate attention that had been hanging for years.

¶ It has been very beneficial for me to sit and listen to ideas of other men who have far more experience than I.

¶ I've had better cooperation from other foremen and far less trouble than ever before since we started these meetings.

¶ It made me see the value of the little things that are so easy to overlook and the necessity for cooperation.

¶ Progress has certainly been made in these group meetings and there are many more valuable opportunities ahead.

clearer understanding of their own place in the successful and efficient operation of the plant, they began to be conscious of the fact that their ideas about the work of certain executives and their departments, particularly the staff departments, were still somewhat vague. Some of them wondered why, in certain cases, other departments couldn't do their work differently, in ways the average foreman would like better. Others realized that if they as foreman knew more about these staff men, they could cooperate with them more effectively.

This attitude on the part of the foreman, as shown in their group discussions, gave the management just the opportunity it wanted. The foremen were encouraged to express their wishes, with the result that they asked to know more about ten different departments of the company, directly from the officials of those departments.

These ten departments were: Sales, Purchasing, Planning, Material and stock maintenance and control, Engineering and drafting, Inspection, Accounting and cost keeping, Maintenance, Traffic (receiving and shipping), and Time study.

A very interesting and valuable series of meetings was the result. I don't know that the particular mumblings and grumblings and questionings quoted in the right column of the opposite page ever actually occurred at Ward Leonard's plant. But this much seems certain: they would be totally out of place in the Ward Leonard organization since these get-acquainted meetings have been held.

The foremanship meetings were already being held in four groups of about 12 men each:

1. One group composed of division superintendents, factory manager, and staff executives.
2. One group composed of general foremen.
3 and 4. Two groups composed of foremen.

The procedure was as follows. One entire meeting of each group was first given over to having its members propose questions they would like to have asked of a given department. The questions asked by the four groups were then set down in writing, with slight editing to eliminate duplication and near-duplication, and handed to the department executive who had agreed to answer them. This executive then had a week or more to prepare his answers to the questions. On the appointed date he appeared before the four groups in succession and gave his answers verbally, but with the full advantage that comes from thoughtful preparation.

A record of both questions and answers was kept for all the meetings, and an edited and slightly condensed copy furnished to each foreman for further study and reference and for his permanent record.

The executives of any electrical factory would find the records of these meetings very interesting reading.

For one thing, the wide range of interest and curiosity shown in the questions is impressive. As might be expected, a certain number of the questions represent grievances or misunderstandings hitherto concealed and now coming to the light in this direct fashion. Anyone who knows foremen—or human nature, for that matter—will realize that an occasional question was intended to "show somebody up." Such questions are, of course, very desirable. If a man has a grievance "on his chest," there is no remedy like the opportunity to ask a question and get it answered.

But a surprisingly small number of questions are of this character. The great run of them indicate, rather, a live desire for a better understanding of the aims and organization of the company, and, particularly, an understanding of the other fellow's job where it comes in contact with the foreman's own.

To any executives, the answers to the questions are even more interesting. The answers brought out at some of the meetings are almost condensed text books, or manuals. But they are text books that somehow throw a new light on much of what goes on within a factory.

"Why the necessity for so many types of products and units?" the foremen asked D. J. Burns, vice-president and general manager, in the meeting devoted to the problems of the sales department.

"Why the necessity of rush orders?

"How does a salesman figure when to promise delivery?

"How far does the salesman go in trying to sell what we can best produce?

"How does a salesman meet the demand of a customer for something not in accord with our standard specifications?

"From what angles is production considered in making a sale?"

Pretty keen questions these, which are only a few of the 23 which Mr. Burns was called upon to answer. And what company would not welcome the opportunity to lay before its factory supervisory force a new viewpoint such as this, which is part of Mr. Burns' answer to the second question I have quoted?

"Don't think we are different than other companies when it comes to 'rush' orders. This is an era of low inventories and hand-to-mouth buying. Competition forces manufacturers nowadays to make quicker deliveries than ever before in order to get the business. When we check up our own purchases from other companies we find that we are demanding 'rush' delivery from other companies just as we are being rushed by our own customers."

And this one, in part answer to a question as to how other departments could be of help to the sales department?

"It would be ideal if every last man in our employ had the instincts of a salesman, and would think of his own performance of his own job in terms of its effect on sales."

Incidentally, though he alone talked on sales, Mr. Burns was not the only executive able to introduce the sales point of view to the foremen's consciousness.

A. A. Bernard, Works Manager, contributed this idea to the meetings, in answer to a question about the factory planning department:

"The members of the planning department have no authority to give orders to the foremen. However, in their position between sales department and shop, customer and shop and engineering and shop, they pass on to the superintendent of a floor the desires of a customer or salesman, and as we are all working in the interest of the customer it is understood that requests will be followed as expediently as possible. Let it be understood here that no one in the planning department is blown up with authority. He is the customer's contact with the shop and his desire is the customer's desire. His anxiety is the possible holding of a customer. Remember our field is more competitive than ever. We actually have to do today what was impossible a few years ago. If we don't meet the customer's demands, the other fellow will."

Another opportunity which Mr. Burns seized was to tell these men in exactly what particulars the company's products were ahead of competition, thus demonstrating to them the importance of maintaining quality through effective supervision.

Typical of the questions which were put to the executives of manufacturing departments are these which W. W. Miller, manager of Engineering, had to answer:

"Does an engineer have any authority to give orders in shop departments?

"What position should the engineering department take when production finds material, passed by inspection, that is not suitable for use, and on the basis of this fact the inspection department reverses its decision?

"How far should engineering go in consulting other departments regarding designs of products?

"If an employee has a patentable idea what is policy relative to compensation for it?

"What tests does engineering put new designs to before turning them over for manufacture?"

Mr. Miller's answer to the first of these questions (and, by the way, thirty-eight questions fell to his lot) is another example of the valuable clarifying information which can be laid before an interested group like this:

"Engineers have authority to decide how apparatus should be built; that is, they are responsible for design, and with this responsibility they naturally must have the authority to have apparatus made according to the design. However, engineers do not have authority to tell any particular shop man to do any particular work, as the shop man naturally works for the shop foreman or superintendent, and all orders must come from his own immediate superior. In other words, the engineers have authority to say how a thing should

(*Continued on page* 64)

Does This Happen in Your Factory?

"NOW, why in the devil is the sales department always in such a rush?" grumbles foreman Bill Knudsen, as the red ticket representing the latest "special" is put into his hands. Mumbling a bit more about "I'll show them what 'hurry' means," he unconsciously passes his discontent on to the men in his department as he gives them their orders.

Or This?

"SAY, Jim. I don't like this business of having the engineering department giving orders to my men," protests another foreman to his superintendent. "How can I be expected to maintain discipline if a man can come back at me when I call him short, and tell me that wasn't the way that young cub of an engineer told him to do the work."

And Isn't This Typical Too?

"I WISH I understood more about this darn time-study business," remarked one of the younger foremen. "I can see that it works, all right. But I often wonder if it could not be made to work better. I believe I could help it to work better if I had more of a notion about what the time-study man is driving at and what he wants to accomplish."

The Management Also Has Some Questions to Ask

Cost Accountant

"WHY is it that I can't seem to get any cooperation out of a department foreman? Some of them almost refuse to help us on questions concerning costs of production."

Chief Engineer

"I WISH I could put over a little idea to the men down in Department 5 as to how that new heater should be assembled without the foreman acting as if I were treading on his toes."

Works Engineer

"I OFTEN wonder why it is after working with each other all these years that our different departments don't seem to cooperate with each other and pull together as they should."

The Scene

Almost Any Electrical Plant

Yours?

Business Is Sound

To ELECTRICAL MANUFACTURING'S *query as to the effect of stock market conditions on the electrical industry, leaders of the industry reply in a generally optimistic vein*

IN reply to its query, "What effect will recent stock market movements have on electrical business now and next year, and why?" ELECTRICAL MANUFACTURING *has received messages from many industry leaders which are published here as proof of the fact that the job of the industry now is to get back to work, with well founded optimism as to the prospects for* 1930.

THE EDITOR.

Business Will Increase

By E. N. Hurley, Jr., Hurley Machine Co., Chicago

WE anticipate increased business for 1930 and will double our advertising appropriation to insure us our share. Most electrical appliances pay their own way and are far from the luxury class. Our particular appliances are sold primarily in homes with annual incomes of $5,000 or under. We don't believe that this enormous stratum has ever had enough money to margin stocks.

As long as employment continues close to normal, labor-saving devices will be sold in quantity. Our thousands of distributors and dealers have no inventory problem. We are behind in deliveries and enjoying the greatest November in our history. Only three out of our 1200 employees suffered any serious loss in the market and we are all going to stop talking market and do a little heavy concentration on our business.

Basic Conditions Are Sound

By E. W. Lloyd, Commonwealth Edison Co., Chicago

IT is too early to say definitely just what effect the recent stock market drop will have on our business generally. Just how far the recent credit inflation brought a large public into the stock market does not seem to be very well known. If the group who lost money in the recent collapse is large in numbers, the slowing down of business will be more marked than if the numbers affected were relatively small.

There is nothing unsound in the basic business of the country and panics of the past have seen recoveries in comparatively short periods when basic conditions were worse than they are today.

The electrical business has by no means reached the saturation point, either in the use of electricity or electrical merchandise. Our business has never seen a year with a decrease in the use of electricity, and it is not reasonable to expect this to happen now.

Foundation Is Strengthened

By Leon H. Frank, Bull Dog Electric Products Co., Detroit

WE should mentally divorce the present stock market from business conditions. Stock buying by the general public during the past two years has enabled American industry to practically eliminate bonded debt and bank loans. This is particularly true of the electrical industry, and this makes a strong financial foundation. If there is a slowing up other than seasonable in the electrical industry, it will give us the usual beneficial breathing spell to catch our breath for the next big business push. Our volume is very good and we expect it to continue so.

More Lighting Equipment

By Charles L. Benjamin, managing director, Artistic Lighting Equipment Association

IT is the consensus of opinion of leading building material manufacturers that building construction, particularly homes, will be stimulated by the collapse of the stock market. A large volume of funds which has been locked up in Wall Street will be released and will be available for financing building construction.

Quotas Not to Be Changed

By G. W. Mason, Kelvinator Corporation

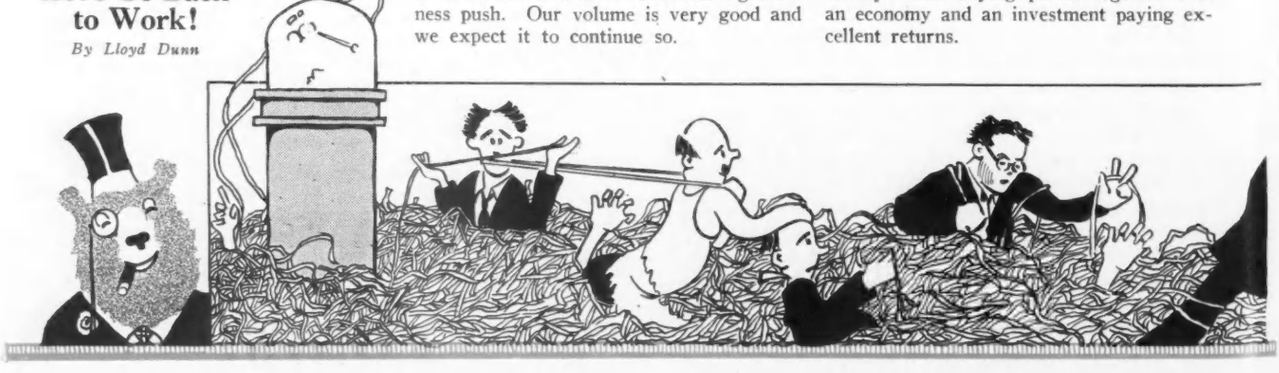
I RETURNED Nov. 19 from a five weeks' trip covering all Pacific Coast cities as well as the Southwest, including Texas, Oklahoma, and Missouri. As the result of a careful check of our outlets in these territories we will not change our quota allotments in our budgets for these territories. These markets apparently contain very few stock speculators.

"THERE is nothing of the country" — "I program in 1930" — "Home be stimulated"—"We should stock market from business smoke clears away the continue to be just as success

We have not received any cancellations from any distributors or dealers in any part of the country on account of the stock market break. Electric refrigeration in no sense of the word can be considered as a luxury. The buying public regards it as an economy and an investment paying excellent returns.

Let's Go Back to Work!

By Lloyd Dunn



Our shipments for October and November to date are 43 per cent ahead of last year. Current orders are running 50 per cent ahead of last year. We feel that readjustment in securities prices will not seriously affect our business.

Very Little Effect Is Seen

By A. I. Appleton, Appleton Electric Co., Chicago

I BELIEVE the stock market has very little effect on the electrical business now, nor will it have next year. I believe that business conditions in the country are sound and I expect a bigger volume next year in the electrical industry over 1929.

We would be better off if we paid more attention to business and less attention to the stock market. Therefore, let us all get together and exert our efforts for a prosperous 1930.

1930 to Be a Good Year

By Otto H. Falk, Allis Chalmers Mfg. Co., Milwaukee, Wis.

UP to the present time our electrical business has not been affected to any important extent. New orders have been coming in on a normal basis, and there have been no cancellations of contracts. Generally speaking, fundamental conditions throughout the country are sound, and we look forward to a good year's business in 1930.

Expansion Is Coming

By Fred R. Farmer, Beardslee Chandelier Mfg. Co., Chicago

THE recent stock market movements may slow up business a little, but America with its 100,000,000 population of progressive citizens is going forward during the coming year. The electrical business will continue as progressively and successfully as it has in the past. When the smoke clears away we will see people buying mortgages again. They will invest their money with the idea of protecting their principal by securing real obligation or real property. As a consequence money at low interest will appeal to business men to launch expansions, and these, with the usual demands unchanged, should make the 1930 electrical business equal to any past year.

> ***"THE great army of those who are now in the market for radio were not in the stock market"—"Radio sales now and next year will be disturbed little"—"Current orders (electric refrigeration) are running 50 per cent ahead of last year"—"We expect a good year in 1930"—"All indications point to more prosperity"***

> **unsound in the basic business look for a good building construction especially will mentally divorce the present conditions"—"When the electrical business will ful as it has in the past"**

Little Effect on Radio Sales

By Bond P. Geddes, executive vice-president, Radio Manufacturers Association

EXCEPT as stock market conditions affect general business, radio sales now and next year will be disturbed little, if any, barring possible sales recessions in the two large markets, Chicago and New York. While wage-earning power is unimpaired and fundamental business conditions sound, radio sales should be less curtailed than most other merchandise.

The great army of those now in the market for radio were not in the stock market. The principal sufferers were large operators in large cities, leaving the main radio market practically unimpaired while normal wage earnings continue. Few persons, including losers in the market slump, will curtail their comparatively small investments in radio, especially on liberal time payments, unless unexpected general business recession follows stock market movements.

Harmful, at Least Temporarily

By Herman Plaut, L. Plaut & Co., New York

THE stock market reaction is bound to be harmful at least temporarily and in a mild degree to all forms of business. Losses, even of paper profits, running into the millions cannot but have their effect on all stages of industry. To dismiss lightly the biggest financial reverse in the history of industry is to conceal the truth.

There will be a mild dropping off in Christmas purchases by probably 10 per cent of the people of the country, and this is sufficient in itself to prevent the normal increase ordinarily expected. This country is entirely too prosperous to be permanently affected. For 1930 I anticipate a continuation of our prosperity.

No Basis for Pessimism

By M. A. Curran, Bryant Electric Co., Bridgeport, Conn.

IT is too soon to estimate the effect on the electrical industry. Next year it is likely that curtailment of consumer buying power will affect luxuries, but in general the industry should go forward, as the country is in liquid condition, inventories are low and credit and cash resources ample. I don't believe there is a good basis for a pessimistic note at this time.

Expects a 10 Per Cent Drop

By F. A. Ketcham, Graybar Electric Co., Inc., New York

IN budgeting our sales for 1930 we are taking into account the effect of the recent stock market slump on our electrical business. We believe that while our business will not be quite as active as it has been in 1929, it will probably be within 90 per cent of our 1929 total. We look for some decrease for the first few months.

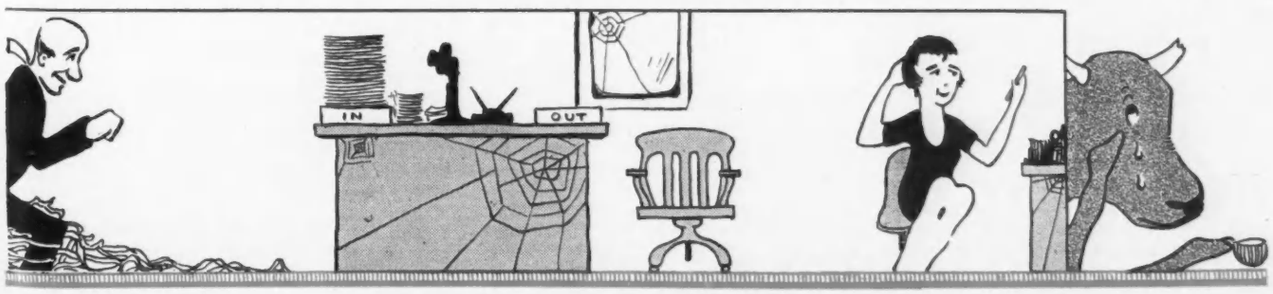
Like all industries that went through the 1920-21 slump, we profited by the experience, and our investments, merchandise and receivables were never in better shape than they are today. Very little loss will be incurred by weakening prices and very few bad accounts will have to be written off.

In other words, the present situation finds our house in order, with all our organization alive to the situation and eager to go after our share of the business.

High Hopes for the Future

By J. G. Harbord, Radio Corporation of America, New York

ELECTRICAL products perform so many services in the American home and have assumed such an important place in American life that it is doubtful whether any temporary stock market depression can have any serious or lasting effect upon the continued prosperity of the electrical industry.



"NEW orders coming in on a normal basis"—"No cancellation of contracts"—"Money will be cheaper in 1930"—"The electrical industry has nothing to fear"—"There may be a temporary slowing-down, but it will be practically negligible as compared with our fast growing electric light and power business throughout the country"

The Radio Corporation of America and its subsidiary companies, all engaged in enterprises in which electricity plays a major part, look to the future with high hopes. We believe that out of the present period of uncertainty a sound economic structure will emerge and a more sensible American buying public will spend an increasing part of its income for those electrical products which help to make life more enjoyable and worth while.

Business Prosperity Is Sound

By C. E. Greenwood, Commercial Director, N. E. L. A.

THE most serious market jolt that we have experienced fortunately came at a time when basic factors in business prosperity are sound. The bursting of the speculative bubble undoubtedly will effect the buying power of many, it will shatter confidence of many more. But funds diverted from stock market speculation can be lured into more substantial investment channels in the purchase of electric labor savers and more complete wiring in the home.

If people are employed they will continue to mortgage future earnings on the "pay as you use" basis. The superb cooperative gesture displayed in the "White House Business Conference" will help keep people employed.

Expect Speedy Recovery

By H. W. Hoover, president, The Hoover Company

TO us it now seems likely that for some little time at least it is going to be necessary for our sales organization to increase their activity by at least 20 per cent to match previous sales records, and we propose making this our program.

The very splendid manner in which the government and President Hoover seem to be facing the problem should bear good fruitage. The splendid financial reserves of the public and of the industry should make a speedy recovery possible from any business slump into which the country might be submerged.

A Boon to Building

By Leo E. Mayer, White City Electric Co., Chicago

FOR the past year the financing of many building operations has been impossible because the high money rate, due to stock speculation, has made building investments unattractive to capital. The recent collapse of the speculative cycle has been disastrous to thousands of speculators, but out of the experience has come a stronger confidence in the fundamental soundness of our country and our business prosperity. As the millions of dollars tied up in speculation come back for business uses, the building construction industry will be one of the first to enter the era of prosperity.

Stimulation of building is certain to follow the putting of real estate and building loans on a competitive basis with call market funds. This expansion will not come over night, but I look for a good building program in the coming year.

Radio Prospects Are Bright

By H. B. Richmond, president, Radio Manufacturers Association

NO answer to a question about radio sales in 1930 would be complete without a statement as to the probable effect of the stock market break in the fall of 1929. It is generally recognized that this break has had a slowing-up effect on radio sales. Our real question is not to try to dodge this issue but to determine whether the effect will be more than temporary.

The stock market is not a thing apart by itself, but is part of our business structure. Business declines occur when there is an overstock of merchandise. What is a business decline? It can best be expressed by a reduction in the number of workers in an industry. When there is an overstock, workers are laid off. In the present decline, the overstock for the first time has been in the hands of the consumer. It is not the manufacturer who owes the banker for large stocks of merchandise in his warehouse, nor is it the jobber or dealer who has a large amount of material unsold for which he cannot pay the manufacturer. This time it is the consumer who has purchased more material than his earning power has enabled him to pay for. Until he can pay for that merchandise, he cannot buy more.

Fundamental conditions are sound; money is plentiful; therefore, it is only necessary that the consumer have a breathing spell to get caught up on his payments. This will not take long, and early in 1930, we should see a real return of buying power.

No Commercial Crisis

By Martin J. Wolf, Electric Appliance Co., Chicago

THE stock market crisis will react on the electrical business and is reacting now. But compared with previous stringencies, there is the outstanding fact that inventories are not heavy. We face the natural result of too much speculation on too thin margins, the shake-down of which was compressed into about ten days' time.

Credit is not exhausted. There is no commercial crisis. Seemingly, it is all speculative. Assuming the exercise of sanity and courage, I think next year sales will be 85 per cent of the 1929 volume.

Market Will Be Good Next Year

By B. J. Grigsby, president, Grigsby-Grunow Company

I BELIEVE that the recent stock market collapse will undoubtedly have an adverse effect on the total volume of business, but that this will not adversely affect business in lower price popular commodities unless unemployment should become greater than is at present anticipated. Building operations might be curtailed, which would affect electrical building construction supplies, but we believe the market in electrical appliances and in our particular field, the radio industry, will be good next year, again placing emphasis on those commodities popularly priced.

Business Goes Back to Work

Business paper editors see 1930 prospects as excellent

FOR the balance of this year and the first quarter of 1930, American industry and trade will be retarded to some extent as the result of the stock market upset, but after that may proceed normally. The upset is having a sobering influence, but it is not anticipated that this will adversely affect the general credit situation. It is believed that money rates will become low enough to permit greater activity in building, public works construction and industrial plant expansion and modernization.

This is the opinion of the business paper editors of the country as developed by a survey jointly conducted by the National Conference of Business Paper Editors and The Associated Business Papers. Each editor reported on conditions and prospects as he saw them in the industry or trade with which his paper is concerned.

In the main they agree that business executives will work harder at their jobs and pay less attention to the stock ticker. They hold that the prospects for 1930 are excellent for the businesses ready to apply the needed additional sales-effort drive, but only those companies which will extend themselves to the utmost will come through the coming year with profits up to the level of the last few years.

No trade or industry has been distinctly crippled, and many editors feel strongly that the result will be lowering of money rates generally and its return from the call money market to localized employment. None of the editors reported drastic reductions in production employment, and all hold that the industries producing or merchandising goods in the luxury class will feel the adverse conditions first and be hit the hardest.

On the other hand, the editors report that industry in general has not been overproducing, and that stocks on hand of raw materials and finished products are low enough for whatever period of retardation may take place. Purchasing power of the general public may decline somewhat, but the editors believe it will not be serious.

7 Steps in Taking Inventory

By J. J. BERLINER

THE physical inventory taken at least once a year may be said to be the cornerstone of every accounting system. It is one of the most vital parts of the business organization. Yet in many plants, the taking of inventory is always dreaded, because it is not done systematically. Inventories are taken hastily and a large part of the routine work is carried out without any definite or prearranged plan. Consequently it often happens that much of the inventory has to be taken again, which lengthens the period and increases expenses.

The correct method of taking inventory is that of the "duplicate tag method." Under this method, detailed preparations are made long before the date set for starting the inventory. Every employee who is to participate in the work is assigned a definite task and is informed as to whom he should consult in case he should need advice. The steps under the "duplicate tag method" are as follows:

1—Issuance of inventory instructions.
2—Counting, weighing, etc., the inventory.
3—Listing the inventory.
4—Pricing the manufacturing inventory.
5—Calculating and extending the inventory.
6—Checking the inventory.
7—Comparing the inventory.

Inventory Instructions—These instructions can be issued either in the form of typewritten sheets or as a booklet. They should be distributed long enough before the date of starting the inventory to permit a thorough study of their contents. Some plants even find it advisable to establish a school of instructions in inventory methods for the benefit of those who will be employed in the work.

As regards the inventory instructions, care must be taken to guard against instructions which are loosely arranged. This fault can be avoided by grouping instructions for each department separately after the general instructions for all departments are set forth. The general instructions usually pertain to the following:

(a) The length of the inventory method.
(b) The personnel of the inventory committee.
(c) The articles to be taken.
(d) Special preparations.

Inventory Dates—The length of the inventory period depends of course on the size of the plant—perhaps only a day or two, perhaps two weeks or more. In large plants most of the departments cease their activities during this period. In small plants, inventory can often be taken without stopping all work, but even in such cases the routine would be expedited if there were a complete cessation of operations.

Personnel of the Inventory Committee—The managers and department heads are on the inventory committee. This committee is assisted by each superintendent and foreman; by tag-writers who make out inventory tags and list items thereon; and by workers who handle, count, weigh, etc., the articles to be taken. Sometimes the accounting department supervises the taking of the inventory. Some plants prepare charts showing how the plant is organized for taking inventory and these usually prove of great assistance.

Articles to be Taken—The names, definitions, and locations of the broad classes of articles to be taken, such as raw materials, supplies, machinery and equipment, furniture and fixtures, work in process, finished products, etc., are set forth in the inventory instructions.

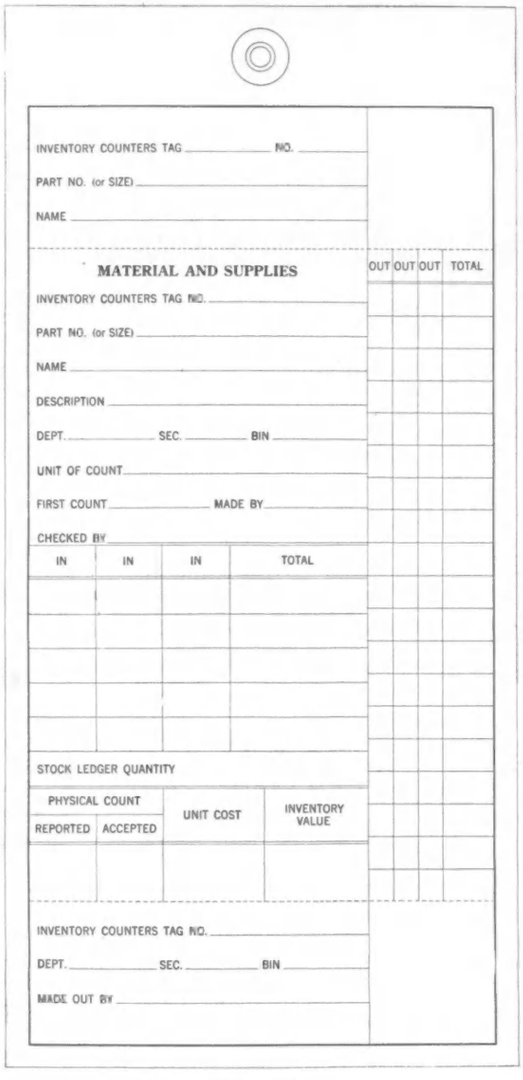
Special Preparations—The heads of various departments are instructed to make certain preparations and to furnish the supervising authority with a list of the names and clock numbers of the clerks and laborers needed in order to taken inventory in their respective departments. In order to expedite inventorying, various departments are assigned definite tasks as enumerated below.

Inspection Department—The inspection department is instructed to clean and inspect goods and work in process. This department also makes a list of defective material capable of correction through repairs.

Salvage Department—The salvage department is directed to prepare a list of all obsolete and scrap materials. These materials are sent to scrap storehouses if they cannot be corrected. Later the scrap is disposed of by the purchasing department with the aid of the inspection department. If scrap can be corrected, it is retained in the salvage department until inventory is completed. Then it is transported to the proper department for correction with a "corrective work order" attached. The salvage department moves goods sold but unshipped, for which shipping orders have been prepared, to storage places provided.

Production Departments—The production departments are instructed to clean up all spoiled, defective, or scrap

goods; to sort and bring together all like job numbers; to put all articles in proper receptacles; and to send scrap to the salvage department. In short, the production departments make a general "house-cleaning." Production departments should minimize requests for materials during the days which immediately precede the beginning of the inventory period, and should bring all work in process so far as possible to the same stage of completion.


INVENTORY COUNTERS TAG _____ NO. _____
PART NO. (or SIZE) _____
NAME _____

MATERIAL AND SUPPLIES — OUT OUT OUT TOTAL

INVENTORY COUNTERS TAG NO. _____
PART NO. (or SIZE) _____
NAME _____
DESCRIPTION _____
DEPT. _____ SEC. _____ BIN _____
UNIT OF COUNT _____
FIRST COUNT _____ MADE BY _____
CHECKED BY _____

IN	IN	IN	TOTAL

STOCK LEDGER QUANTITY

PHYSICAL COUNT		UNIT COST	INVENTORY VALUE
REPORTED	ACCEPTED		

INVENTORY COUNTERS TAG NO. _____
DEPT. _____ SEC. _____ BIN _____
MADE OUT BY _____

Figure 1

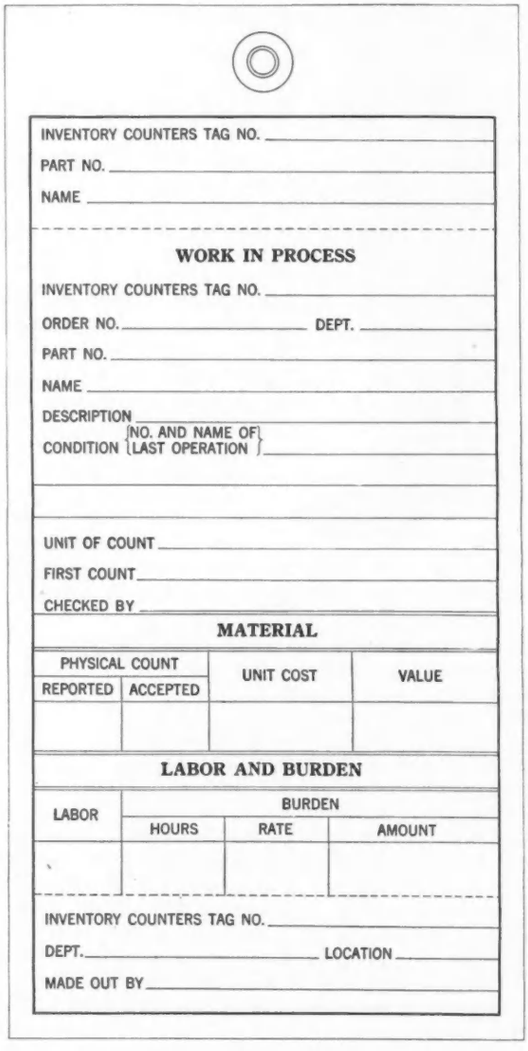
An inventory tag made of carboard and measuring 3½ by 7 in. that is used for listing materials and supplies in stock. These tags are made in duplicate and are numbered serially

Storeroom Department—The stores department is ordered to clean up, to sort and stock its materials, and to place all articles in proper receptacles, marked so as to be readily identified. Scrap and obsolete materials are weeded out and sent to the salvage department. Deliveries from storeroom to factory should cease or slow down several days prior to taking inventory.

Purchasing Department—The purchasing department is instructed to draw up a list of unfilled purchase orders and contracts, arranged according to part numbers or names of material as of the closing date of the inventory period, say Dec. 31. All purchase invoices in dispute are promptly adjusted with vendors and sent to the accounting department before Dec. 31. Invoices passed for payment prior to Dec. 31, are recorded on the books, and goods covered thereby are considered as a part of the inventory even though not yet received. If seller's invoices have not come in, memorandum invoices are made out by the purchasing department and sent to the accounting department for goods received prior to the beginning date of the inventory period, say Dec. 28. All invoices which have been received from goods still in transit should be segregated and listed separately. These may or may not be taken into consideration, but it is sometimes good practice to do so, as goods shipped f.o.b. seller's works are, according to law, the property of the buyer when in transit.

The purchasing department requests outside concerns which have in their possession certain materials, tools, patterns, etc., belonging to the company which is making the inventory, to submit sworn statements covering such articles. It also requests them to furnish a list of the above assets which they may have shipped back to the company a number of days prior to Dec. 31. The purchasing department is urged to minimize the amount of material received during the inventory period. One way to help in this respect is to slow up delivery by ordering goods to be sent by freight which are ordinarily carried by express.

Receiving Department—The receiving department is di-


INVENTORY COUNTERS TAG NO. _____
PART NO. _____
NAME _____

WORK IN PROCESS

INVENTORY COUNTERS TAG NO. _____
ORDER NO. _____ DEPT. _____
PART NO. _____
NAME _____
DESCRIPTION _____
CONDITION {NO. AND NAME OF LAST OPERATION} _____

UNIT OF COUNT _____
FIRST COUNT _____
CHECKED BY _____

MATERIAL

PHYSICAL COUNT		UNIT COST	VALUE
REPORTED	ACCEPTED		

LABOR AND BURDEN

LABOR	BURDEN		
	HOURS	RATE	AMOUNT

INVENTORY COUNTERS TAG NO. _____
DEPT. _____ LOCATION _____
MADE OUT BY _____

Figure 2

This tag is the same in size as Figure 1 *and is used for listing work or materials in the process of manufacture. It is also made in duplicate and numbered serially*

rected to clear its floors of all goods received up to time of starting inventory. Receiving records covering such goods are to be completed and quickly forwarded to the accounting department. Goods received after inventory has started are sometimes kept in the receiving room but are not included in the inventory. This is bad practice, as all dates must necessarily show as of the month which is included in the records. This, of course, applies only to goods actually received before final inventory date.

General Accounting Department—The general accounting department is instructed to obtain a list for the sales department of goods billed but unshipped prior to Dec. 31, so that these goods will not be included in the final inventory. The goods may be inventoried, but the figures are subtracted from the "total" inventory to give the amount of the inventory to be used in preparing statements, etc.

If the general accounting department supervises the taking of inventory, it will have charge of all the tags and inventory sheets. Acting in this capacity, it will charge the tag-writers with the tags and sheets as issued and credit them with returns. The fact that tags are serially numbered helps the general accounting department to keep its records straight. When inventory has been taken, tags are returned to this department. They are checked by serial numbers and are sent to the cost accounting department.

Cost Accounting Department—The tags which the cost department receives from the general accounting department are sorted by classes. From these tags inventory sheets are prepared.

The cost accounting department is instructed to charge all manufacturing costs incurred before Dec. 31 to the various classes of orders. It must see that price records are up to date so that goods may be priced correctly. The cost accounting department or the inventory committee is ordered to price, to calculate and extend, to check, and to compare the inventory.

Cooperation of Departments—The inspection, salvage, and production departments—in fact all departments—are instructed to cooperate prior to the inventory period for the purpose of minimizing the obsolete and defective material which cannot be corrected.

Counting and Weighing the Inventory—Before inventory starts, instructions are issued and studied. Each employee knows what he is to do. When the signal is given to begin, the workers in the charge of foremen or department heads commence to count, weigh, measure, or size inventory items. Goods should be counted, weighed, etc., twice before the tags are filled out.

Listing the Inventory—The results of counting, weighing, etc., are recorded in indelible pencils on the tags by clerks known as tag-writers. The tags are procured from the supervising authority and when obtained each contains a serial number only.

Tags for materials are made in duplicate with perforated stubs and with wires for attachment to the material. As soon as a lot or section of material is inventoried one tag is attached by the tag-writer to the lot or section, the other tag is sent to the supervising authority. If a receptacle is empty, a tag marked "empty" is placed therein. Every tag is accounted for. None should be lost, destroyed, nor borrowed. Spoiled tags should be marked "void" and sent to the supervising authority. Sample forms of inventory tags are shown in Figures 1 and 2.

Most of the data on the tags are self-explanatory. Figure 1 is an inventory tag used in taking inventory of materials and supplies. The inventory tag for finished materials has the same arrangement.

(*Continued on page* 66)

PHYSICAL INVENTORY

MATERIAL _____ Page No. _____ Period Ended _____

PHYSICAL COUNT							STOCK LEDGER		DIFFERENCE			
		DESCRIPTION							OVER		SHORT	
TAG NO.	QUANTITY	Part No.	Name	UNIT PRICE	UNIT	VALUE	QUANTITY	AMOUNT	Quantity	Amount	Quantity	Amount

Figure 3

PHYSICAL INVENTORY WORK IN PROCESS

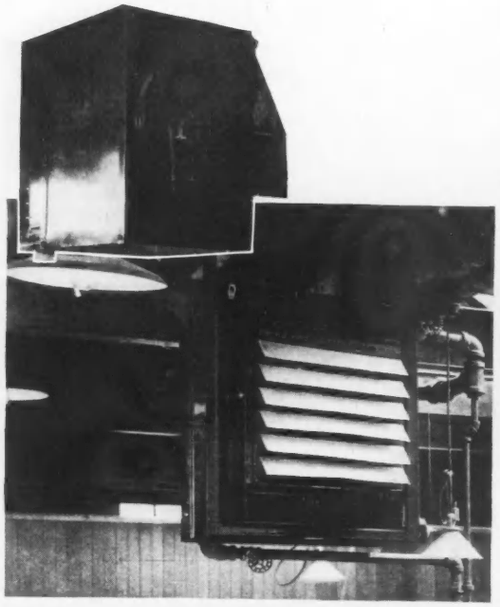
Dept. _____ Page No. _____ Period Ended _____

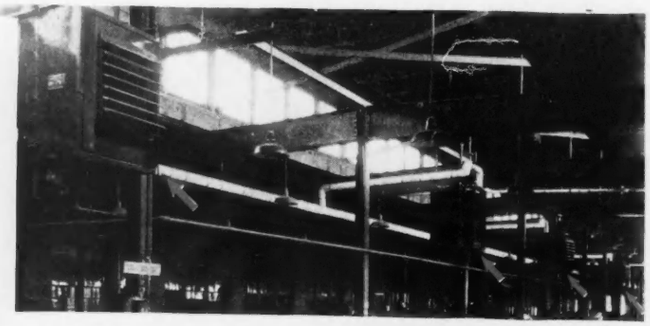
TAG NO.	ORDER NO.	PART NO.	NAME	NO. OF PIECES	MATERIAL			LABOR			BURDEN			REMARKS
					Unit Price	Unit	Amount	Last No.	Oper.	Amount	Hours	Rate	Amount	

Figure 4

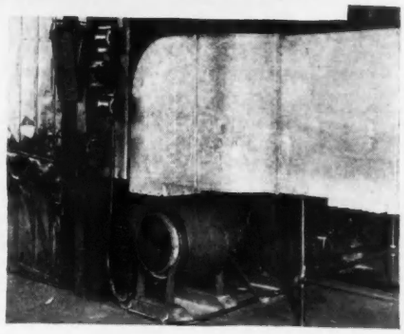
The two forms shown above are the inventory record sheets. One is for materials and supplies and the other for work in process. The data from the inventory tags are entered on these sheets, after which the recapitulation is copied upon summary sheets showing the totals of the various assets of either work in process or of materials and supplies in storage

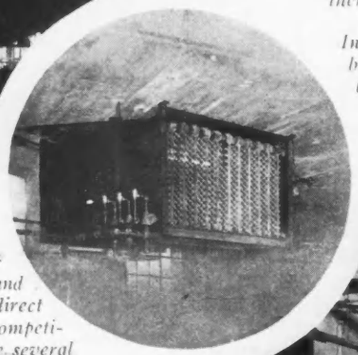
Here is a Market for Unit Heaters in





ON this and the facing page some of the many different types of unit heaters in use in industrial plants are shown. Most of them are used for both heating and ventilating purposes. Usually a unit heater is composed of an electrically driven fan, several heating elements, some form of control apparatus, and often an electrical thermostat



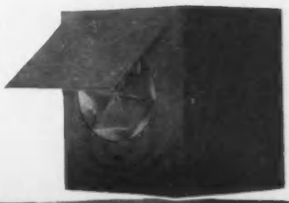


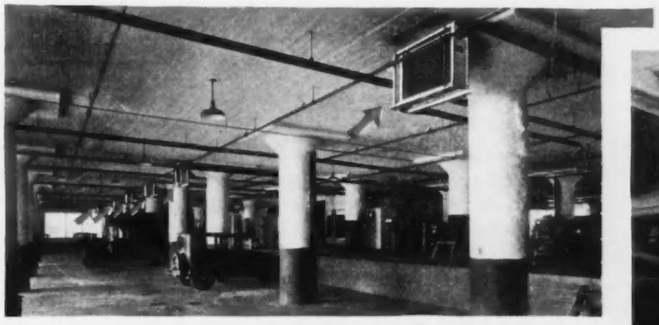
In some industrial installations a battery of unit heaters becomes the principal heating system, replacing furnaces, boilers, firemen, ventilating systems, and such incidentals as coal ashes, smoke and dust. Unit heaters are now well recognized as essential to efficient operation in many industries where there must be accurate control over heat and humidity

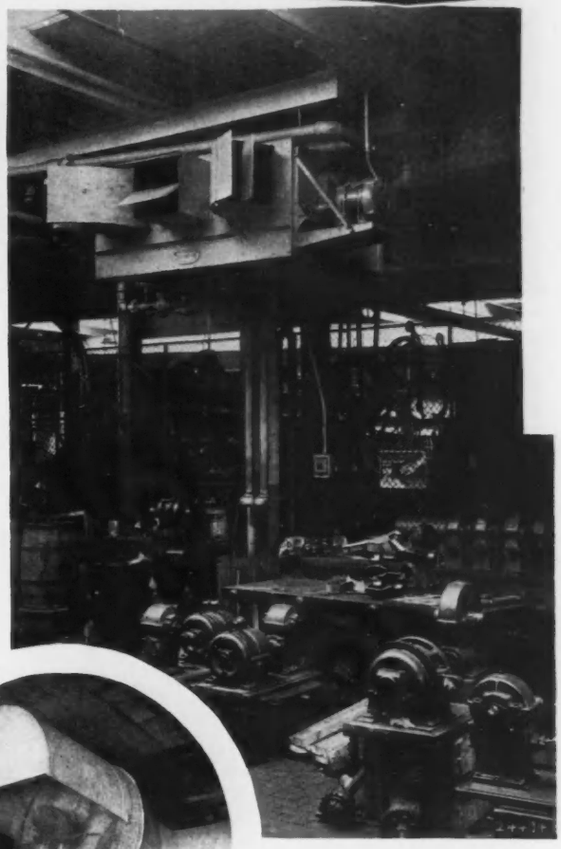
Within a period of a few years, what is generally considered as a new type of heater has come into common use and the old-fashioned system of direct radiation has found a strong competitor in the unit heater. There are several different types of unit heaters on the market and there are more than fifty manufacturers of this equipment, all of them being potential buyers for motors, control apparatus and heating elements in some form or another. The first heater was coal-fired, but now there is a choice of several types of heating agents, but the steam heater is the one in most common use. Originally, unit heaters were supplied with pipe coils, although later types make use of various forms of high-efficiency fin radiation surfaces, the lighter fins being used for pressures up to 50 lb. and heavier designs for increased pressures

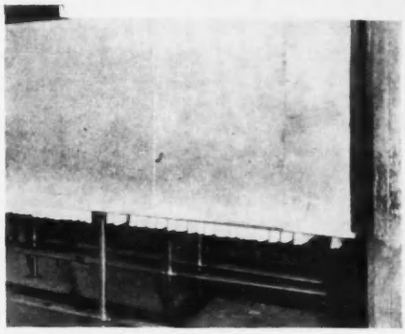
Electrical Equipment

Industrial Plants









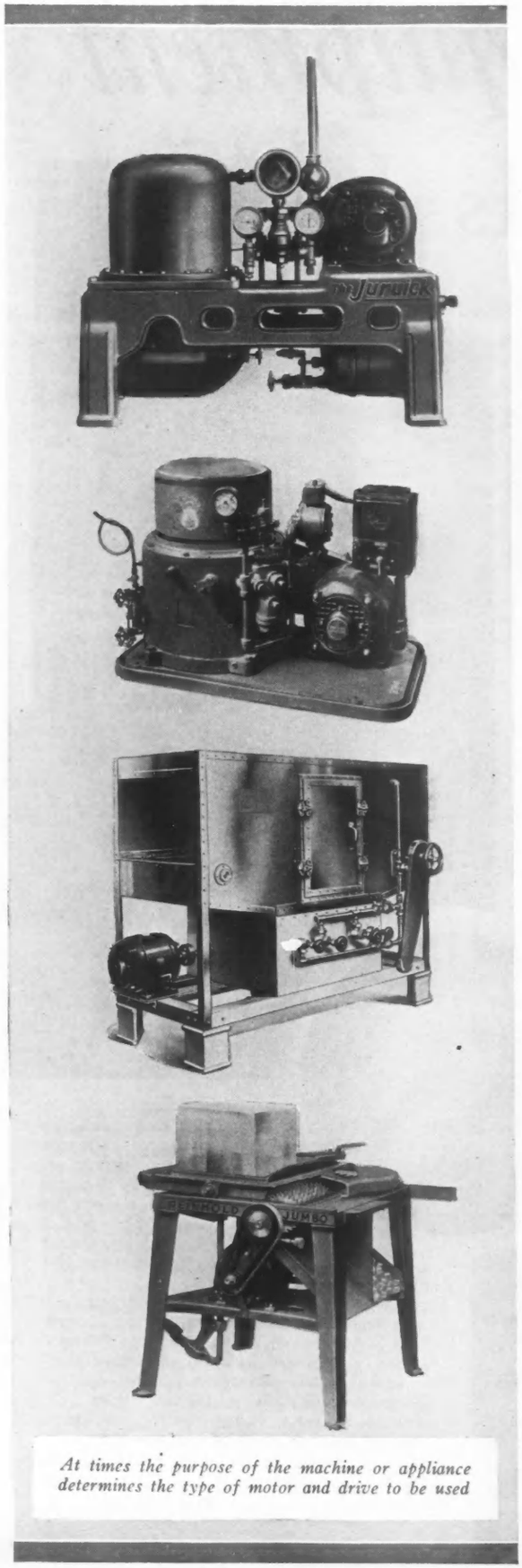
AS may be seen from the accompanying illustrations, there are as many different types of circulating mediums as there are different types of unit heaters. However, most of them take the form of square metal cabinets, within which are housed the motor-driven fan and the heating elements. The fans vary in speed

In the larger types of unit heaters there are often several ducts or outlets for each unit, as a more positive means of circulation over greater areas. As can be appreciated, in installations in industrial plants the control over the ***fans and the heating elements can either*** *be arranged for local or remote control, thus using different kinds and types of control apparatus*

In all unit heaters, whether they be of the coal-fired type or those heated by steam, the size and speed of the motor is dependent entirely upon the capacity of the heater, the size of the fan, and the speed at which it must be operated to deliver the greatest efficiency. For this reason motors as small as ½ hp. are used on some heaters and on the larger types the motors may have a capacity as great as 5 hp. Speeds vary likewise, according to the amount of heated air to be circulated. Usually the lowest speed is approximately 600 r.p.m., but this also depends upon the nature of the installation. Today unit heaters are being used to great advantage in the tobacco, candy, paper and textile industries as a means for controlling accurately the heat and amount of moisture in the air

If I Were a of Motor

By GEORGE A. ARNOLD
Merchandising Manager, The Master Electric Company



At times the purpose of the machine or appliance determines the type of motor and drive to be used

WE all know that there are many good fractional horsepower and small power motors, but at the same time there is a wide range of difference in the satisfaction which these seemingly equal motors render the actual user.

How, then, shall the manufacturer of motor driven machinery and appliances know which motor to select? How shall he gage the market?

Out of an experience on the motor manufacturing side of the problem, I have seen many of the woes that come to the motor user, yes, and to the motor maker too, because the manufacturer of motor driven machinery often overlooks some of the important considerations which bear upon practically every small motor purchase.

So in this article, I am going to try to set down some of the main points I would watch on motor purchases if I were a manufacturer of motor-driven machinery. I am doing this with the hope that it may prove a means on the part of some readers of avoiding waste effort for all concerned.

First, I would see to it that the motors I purchased have sufficient reserve power to be relied upon in service emergencies. Fundamental, you may say. Yes, but still neglected to a surprising degree as an element in motor selection.

The amount of reserve power which any motor has beyond its normal rating is entirely optional with the motor manufacturer and varies with every make of motor.

Overloads, low voltage and so on are sure to be encountered in service. Therefore, it is obviously desirable to fortify against this by purchasing liberally rated motors.

In the second place, I should ask myself if the motor I selected is strong enough mechanically to stand the rough handling to which it may be subjected. Breakage replacements in themselves are sometimes expensive but in addition is the possible loss of good will due to the whole machine's being idle while a broken motor part is being replaced.

The fact that power lines do not always have normal voltage on them leads to the third point I would watch. That is, I would ask myself, will the motor start and carry the load with the line voltage considerably below normal? Too often it happens that because of overloaded feeder power lines, this factor of low voltage becomes of major importance. It is one thing to test a motor on your machine or appliance under standard voltage on the test floor and quite another to have it do its job well when the voltage in service may fall way below normal. So I would have this well in mind when buying my motors.

If I were a manufacturer of motor-driven machinery, I should want also to feel certain that the motor I selected to put on my product would be able to operate without service interruptions for long periods of time. And this

Manufacturer Driven Machinery

I Should—

See to it that the motors I buy have sufficient reserve power.

Determine that the motor I select is strong enough mechanically.

Ascertain that the motor will start with line voltage below normal.

Make sure that the motor will operate without service interruptions.

Want to know that the motor is built of accurate interchangeable parts.

would lead me to look well to the provision for lubrication. Since users have a tendency to neglect lubrication, I would search out a motor which even with sleeve bearings will give as many as a thousand hours continuous running without attention. They are available, so I should search them out and insist upon them.

Just as in the case of mechanical breakage, it is the loss of production, and consequently the quiet undermining of good will which may be more expensive than the repairs necessitated by the neglect in maintenance.

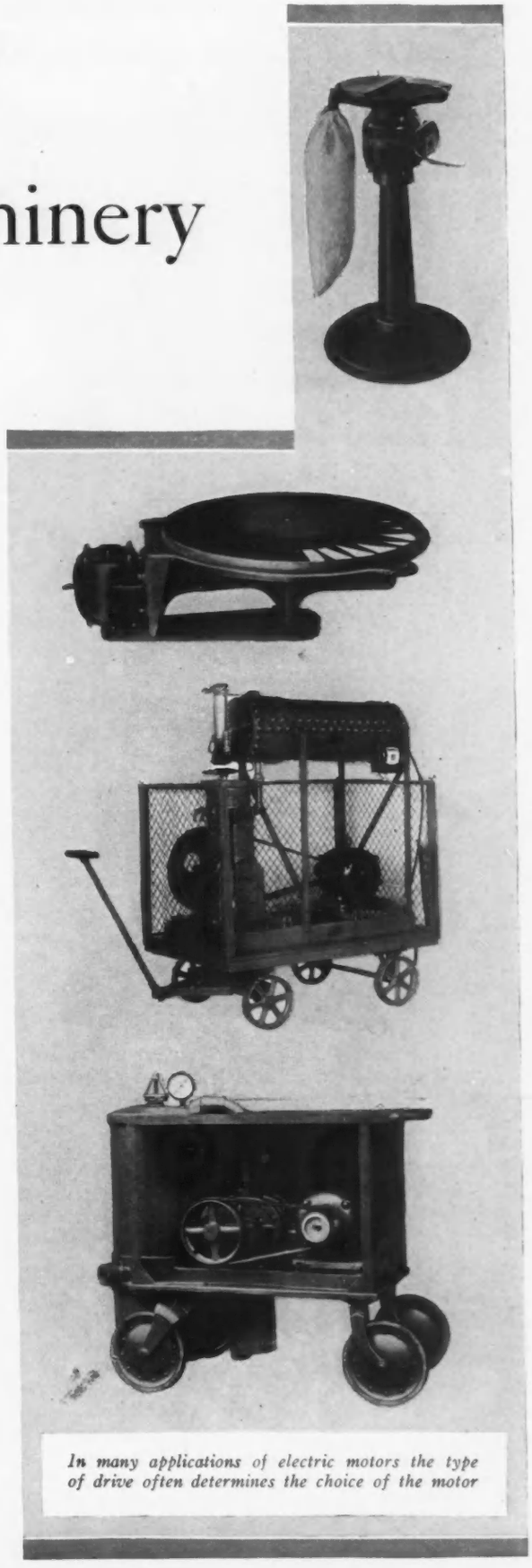
Fifth, because of the occasional necessity of service changes out in the field, I should want to know how few base mountings and shaft heights are possible to meet the requirements. Obviously the mounting expense is reduced and the ease with which service changes can be made in the field is increased if the motors are interchangeable in principal dimension and many parts.

Closely allied to this fifth is the sixth point which I would make. And the motor buyer frequently entirely overlooks it. I refer to the desirability of seeing to it that the motor is manufactured with the proper dies, jigs and fixtures so that not only accuracy but uniformity is obtained. Only in this way can the fitting of replacements in the field be obtained without extra labor.

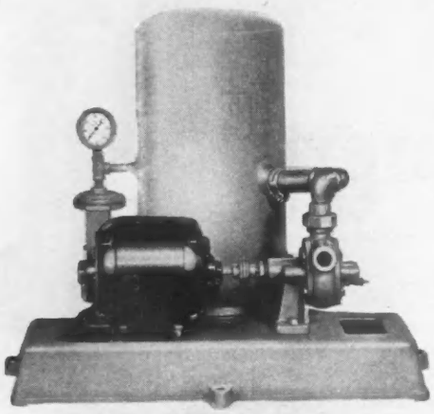
So, I would make sure that the motor I selected to drive my product was built in a plant properly tooled so that each part will be as near an exact duplicate as it is commercially possible to make it. Incidentally, uniform motor parts insure uniform motor performance.

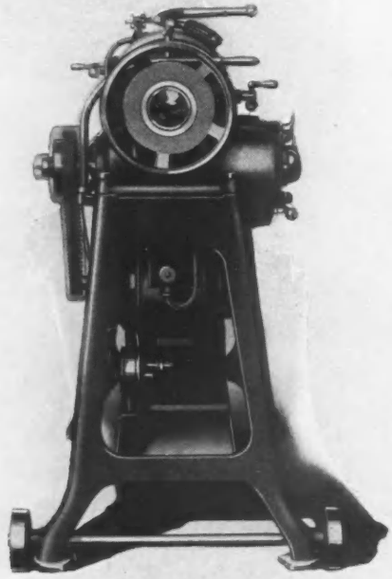
But, this is quite a different matter from having a "standard" motor. So often you hear manufacturers say, "We are using so-and-so's motor because it is standard." Now any motor that is built according to the rules and specifications of the American Institute of Electrical Engineers or the National Electrical Manufacturers Association and that conforms to the Underwriter's code, is a "standard" motor. Neither a large nor a small concern has a corner on the manufacture of standard motors.

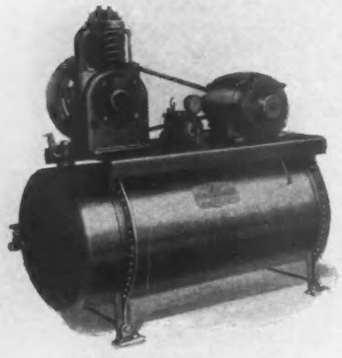
If I were a manufacturer of motor-driven machinery, it seems to me that I should also expect of the motor I



In many applications of electric motors the type of drive often determines the choice of the motor







Often the design of the machine or device has considerable to do with the selection of the motor

bought, an attractive appearance. Of course, I fully appreciate that this is not always the factor that it is in the style industries, nor is it so much to be taken into account in industrial applications as when the motors are mounted upon appliances. But, nevertheless, the mechanical lines of the motor and the finish should be sufficiently attractive to the eye to lend a certain quality of distinction to the machine which it drives.

Also, if I built a motor into my product, I should want to know whether the reliability of that motor had been tried and proven by years of service. In other words, I should want the other fellow to have found the "bugs" which are always present in any untried piece of equipment. So I would put not too far down the list the choice of a motor which has proved its merit in actual service.

Then, too, if my needs were for a small motor or for a special motor, I am certain that, other things being equal, I would pick out the manufacturer who specializes in the particular type and size of motor I need. It is reasonable to expect under such a plan that specialization brings a high degree of efficiency, a refinement of product and excellent service within the range of that specialized product.

If I made motor-driven machinery or appliances, I hope I should remember to do one thing that many motor buyers forget, only to remember later at considerable expense. I refer to the consideration not alone of the electrical design but of the mechanical design with respect to accessibility for making replacements.

Some study should be given to this phase of the design to find out whether the parts which are more likely to call for periodical replacement, such as bearings, and brushes, are accessible and can be replaced without special tools.

Nor would I fail to look carefully into the motor manufacturer's service policy if I were a maker of motor-driven machinery and appliances. No matter what the motor chosen, there is bound to be a certain percentage of service adjustment. I would, therefore, select a motor manufacturer that has a liberal service policy—not one that uses the guarantee as a deadline upon which to make all service adjustments. So, it becomes important to investigate this phase of motor purchase rather carefully.

And there is another point that goes back of the motor to the company which makes it, which I would want to interest myself in before I placed my motor order, particularly if it were a large order. That is, I should want to know whether the motor manufacturer had factory facilities large enough to handle my requirements efficiently. Nor would I necessarily be content to get my impressions on this point from trade catalogs. I might want to make a personal inspection of these facilities.

Not a word have I said yet on price. Price, of course, is a tremendous factor in the purchase of anything, not alone of a motor. But, at that, I am certain that I would not buy wholly on price. I have seen too many of the evils that follow in the wake of that sort of thing. A small saving in the initial price of a motor can very easily be lost by abnormal service requirements in the field.

If I were a manufacturer of a motor-driven machine or appliance, I would try to appreciate that when I purchase a motor, I am really buying—or ought to be buying—performance or the ability of the motor to handle a certain load through long periods of service. If I haven't done that and all of that I haven't purchased a motor in the fullest sense.

Now obviously there is a considerable price range over which a motor of a given horsepower and speed may be purchased, but I should try to remember the other factors that help make long time satisfactory performance and protection of good will, and try to strike a reasonable balance between quality and price. Only then would I feel safe in the selection of the motor I was to put upon my product and that the reputation of my product was secure.

Germany Prefers These Appliances

How 133,301 Germans "Voted"

TOASTERS and waffle irons, two of our most common appliances, received less than 1000 votes each, while there were no votes registered at all for ironing machines. This should indicate clearly to electrical manufacturers who plan to enter the German market that they face a different demand situation than that existing in the appliance markets at home.

ELECTRIC household appliances of all kinds are meeting with ever-increasing favor in Germany, not only because of their adaptability and simplicity of arrangement but also because of their time saving qualities and cleanliness.

As a sales market for certain American products of this category, Germany presents a fairly attractive aspect. American refrigerators, vacuum cleaners, floor polishers, and washing machines have found an outlet in Germany. They are sold on the basis of their superior performance and adaptability, and are regarded as the standard of excellence, according to American vice consul C. T. Zawadzki.

German manufacturers frequently copy popular American models, although the resultant article seldom compares favorably with the original in quality or performance.

The use of electric household appliances in Germany is mainly a postwar development. Previously, such equipment was principally in its experimental stage of development, and those appliances which reached the market were crudely constructed and extremely short-lived. The demand increased sharply after the war, and at present all kinds of electrical household appliances are marketed in Germany, although to a much smaller extent than in the United States.

The relatively low salaries of domestic servants and the high price of current in certain sections

of Germany, coupled with the absence of electric wiring in many houses, prevent a more widespread use of such equipment. Although the prices of German appliances are lower than those in the United States, incomes are relatively smaller, and the question of price also plays an important role.

Notwithstanding the factors mentioned above, a fairly successful market was found in Germany even for such labor-saving but costly household equipment as vacuum cleaners, washing machines, and, to a smaller extent, ironing machines, which had been generally regarded with prejudiced disfavor by the German housewife.

The purchasing power of the public has increased sufficiently to enable many families to purchase some sort of electric household equipment. Low-rate installment payments are in general use, and dealers continuously put increased effort in the merchandising of such products on the deferred-payment basis.

Servants in Germany have a general knowledge of the use of electric household appliances and often, when changing positions, influence the purchase of such apparatus.

In December, 1928, Berlin retailers of electric household appliances conducted an investigation as to what the public considered to be the three most important electric household appliances at present on the market and which therefore ought to be purchased first. Questions were put to 133,301 persons, and the appliances selected, together with the number of votes each received, were as shown in the accompanying graphic chart.

Price Is a Factor in Germany

TEAPOTS, waffle irons, toasters, water bottles, and cigarette lighters each received less than 1000 votes. The results of this investigation are interesting in that they show that certain equipment which was most time and labor saving—washing machines—was chosen by only 15,102 persons, while none chose ironing machines.

The market for American electric household appliances in Germany seems to be limited to those commodities which have not been well developed by the German electric industry, such as washing machines, ironing machines, refrigerators, vacuum cleaners, and dish-washing machines. In these lines Germany is a field worthy of cultivation. In other lines, such as irons, heating pads, cooking and heating equipment and fans the German industry has made rapid development, and many of its products are considered good.

The chief obstacle to the sales of American household appliances in Germany is the question of price, which invariably is higher than the prices charged for similar German products, although the better quality of American equipment should offset this factor considerably.

Electrification of households in Germany has, of course, been highest in the urban sections. In the rural sections little progress has been made, and there are many sections of the country where the development has been very small. It is estimated that not more than 20 per cent of the houses in Germany are wired for electricity. In the cities, however, this percentage often runs as high as 45.

In the last few years remarkable progress has been made. All the newly constructed houses are wired for electricity, not only for lighting but also, through a generous distribution of outlets in practically every room, for motive power for various appliances.

According to official statistics, there were 8726 electric plants in Germany in August, 1928. The output of current of the entire German electric industry amounted to more than 21,217,614,000 kw-hr. in 1926. Germany imports over 300,000,000 kw-hr. annually from adjacent countries and exports about 80,000,000 kw-hr. The total consumption of current in Germany, therefore, amounts to about 21,450,000,000 kw-hr. per year, including a line loss of about 10 per cent.

German industry consumes about 80 per cent of this current; households, communities, hospitals, and retail stores take 9 per cent; and railways, etc., take the remainder.

The cost of electric current in Germany varies; in some places it is as low as 0.16 mark ($0.038) per kw-hr., while in others it is as high as 0.60 mark ($.142) per kw-hr. In most cities of Germany reduced night rates are available.

In order to reduce the operating costs of electric household appliances, current for power is available in many cities at rates about one-half lower than those charged for the regular lighting current, but extra wiring was up to now necessary. It is understood, however, that a new domestic electric meter has been developed in the form of an intermediate meter which can be switched in between the main meter and the apparatus used. For all kilowatt-hours which pass through this intermediate meter the consumer will be refunded the difference between the cost of lighting current and the cost of power current. The meter has been called the "reimbursement meter."

The German electric-manufactures industry is in a good condition at present, and many firms have increased their capital. It is strongly organized and carries on a very intensive and rather successful propaganda for the purchase of German-made goods. Since the end of the war, continuous appeals are being made to the national loyalty of the people on the ground of national welfare and prosperity.

In no other industry were there as many new firms established during the inflation period as in the electrical industry. A large part of the products of this period, especially household appliances, is still on the market, having been bought up by dealers at bankruptcy sales. The products are, however, of poor quality but appeal to the public because of their cheapness. To offset the competition of these products, the Association of German Electrical Engineers places a stamp of quality (VDE) on most of the modern German electric household appliances, showing that these products have been tested and that the apparatus meets the minimum safety regulations of the association.

Germany Has Extensive Appliance Outlets

ACCORDING to official statistics issued during 1928, there were 2976 wholesale dealers and 2773 retail dealers in electrotechnical products in Germany. Aside from these firms, however, there are 762 hardware wholesalers, 11,765 hardware retailers, 11,541 household equipment retailers, and 640 department stores dealing in various products, including, in many cases, household electric appliances.

Household electric appliances are not separately classified in German import and export statistics but are usually grouped under one general heading. The following statistics, for the first 10 months of 1928, will, however, give an idea of Germany's trade in some of these lines.

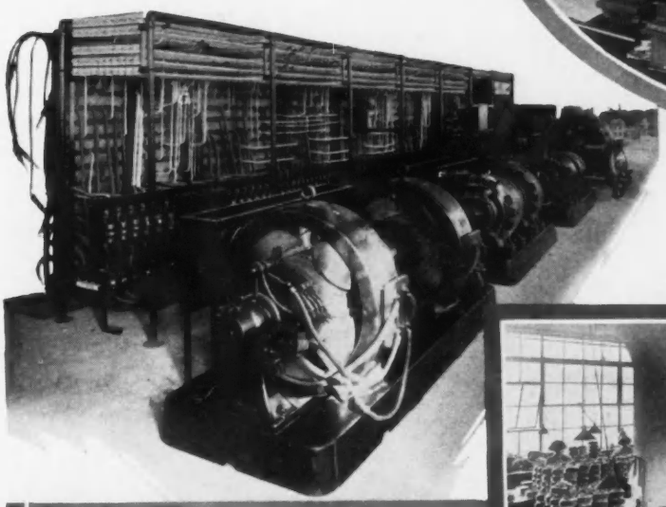
During these months imports of electric irons amounted to 1600 kilos, valued at $1,191, and exports, principally to the Netherlands, Brazil, Argentina, and England, amounted to 527,500 kilos, valued at $289,413. Imports of cooking and heating equipment, principally from Switzerland, were 130,700 kilos, valued at $157,450, and exports, mainly to the Netherlands, Italy, and Great Britain, with large quantities to Argentina and Australia, amounted to 1,056,000 kilos, valued at $1,586,650. Cooling-machine imports were 908,400 kilos, valued at $795,350, principally from the United States, the Saar Valley, and England; exports were 3,103,800 kilos, valued at $1,663,090, and were shipped principally to the United States, Argentina, the Netherlands, Brazil, Austria, and Russia.

It is estimated that there is one vacuum cleaner for every 15 families in Germany. There are several American cleaners on the market in Berlin, but sales have not been altogether as satisfactory as might be expected when one

(*Continued on page* 57)

An Electric Motor Builder's Plant

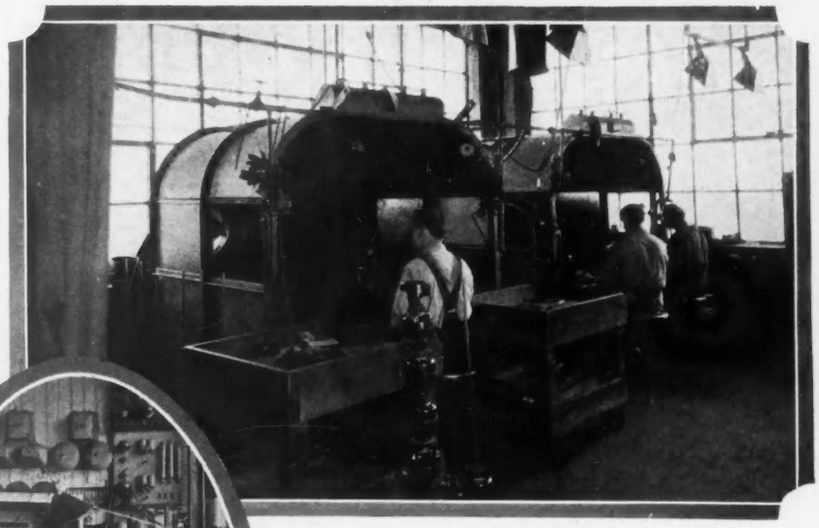
THE business of the Holtzer-Cabot Electric Company, of Boston, Mass., was founded in 1875 by Charles W. Holtzer, to manufacture certain simple electrical devices. It has since grown to have a prominent place in the electrical industry, and in addition to making a general line of signal apparatus, this company is a large manufacturer of electric motors, principally of the fractional horsepower sizes. Its present factory, at 125 Amory Street, with its auxiliary departments, has about 150,000 square feet of floor space. It was occupied in 1915



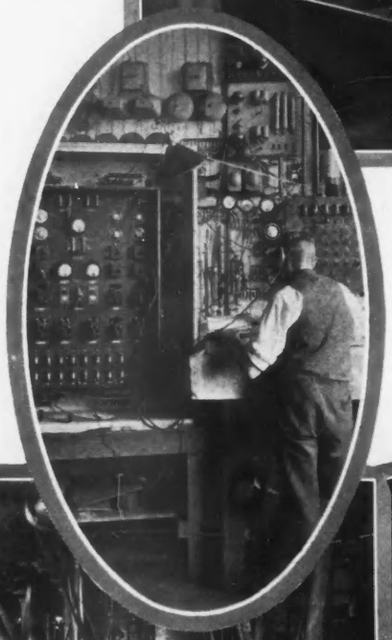
SINCE every piece of apparatus constructed in the Holtzer-Cabot plant receives a most thorough inspection and performance test, it is necessary to provide such a test rack as that shown at the left. This board will supply any power needed

THE Holtzer-Cabot Company looks after the safety and health of its employees, and to assist in this work it has provided the well-appointed first aid room shown at the left. Every armature shaft produced in the Holtzer-Cabot factory must pass a rigid inspection for balance and straightness. These tests are made in such machines as that shown in the oval at the top of this page. A number of indicating gages are mounted on the machines, according to the length of the shaft to be tested. Directly above is a small section of the coil winding department. In it are to be found such equipment as winding, taping, and spreading machines. Notice in all of these illustrations the clean and orderly arrangement of the plant and that wide aisles are provided

MANY of the motor parts and much of the signal apparatus built in the Holtzer-Cabot plant is finished by spraying. One of the several spray finishing installations is shown in the view at the right. These booths are of the most modern type, fitted with rotating tables for the work, ample ventilating ducts and fans, and good light. Finishing materials such as the lacquers used are supplied through feed lines from a central storage tank. For convenience in handling the various parts after they have been finished, trucks similar to that shown have been provided. Adjacent is the dipping and baking section



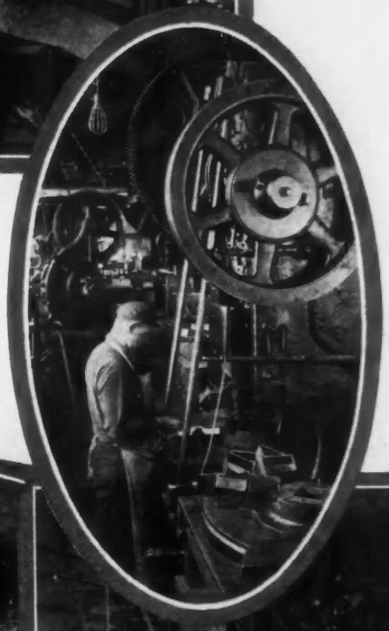
ANOTHER inspection operation is shown at the right. This workman is testing the performance of one of the smaller types of signal apparatus control panels. It is the practice in the Holtzer-Cabot plant to assemble such apparatus complete in the box in which it is to be shipped, but before it leaves the plant it is subjected to the most rigid performance tests. For the larger types of control panels large metal racks are provided upon which the apparatus is assembled and tested before it is crated for shipping



THE present factory of the Holtzer-Cabot Electric Company is a five-story brick and concrete fireproof building with a full basement. Practically all of the first floor is taken up with offices, and the remainder of the plant is used for manufacturing operations. Adjacent to the main building are the power plant and the foundry and a railroad siding

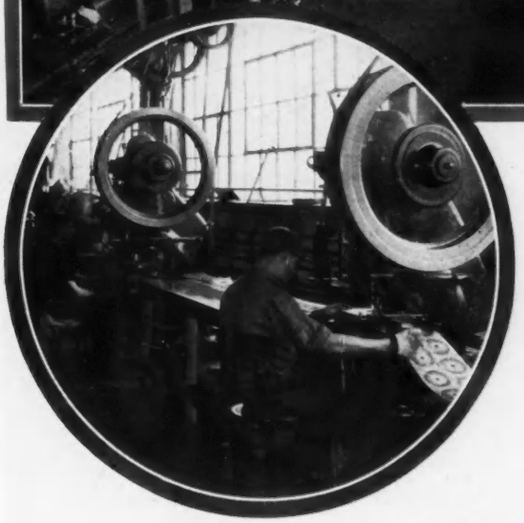
AT the present time the products of the Holtzer-Cabot motor department are confined largely to special forms of small motors for application to automatic machines, office and domestic appliances, farm and dairy machinery, medical appliances, coffee mills, meat choppers, and many other similar uses. In the way of signal apparatus, this company makes practically all manner of call and signal systems for almost every use to which such equipment could be applied. To manufacture such a great number of devices naturally requires a modern and well-equipped screw machine department such as that shown in the illustration directly above. Here are to be found multiple and single spindle machines, and practically all of them are of the automatic types. Above the circle, at the right, is a section of the carpenter and pattern shop. It is here that most patterns, wood panels and cases and all materials for shipping are produced. In the circle is the front of the test board mentioned on the first page of this article

TO insure absolute interchangeability, practically every part of the motors and signal apparatus manufactured by the Holtzer-Cabot Company is produced with the use of suitable tools, fixtures and jigs. Even in the smaller drilling operations, such as that shown at the left, small drill jigs are employed. This view shows but one battery of small multiple spindle drill presses in one of the motor manufacturing departments. While much of the materials and parts in the process of manufacture are handled by overhead hoists, skids, boxes and lift trucks are also used in transporting work throughout the plant



MANY of the smaller parts entering into the construction of electric motors and signal apparatus are made from metal stampings, and these are produced in the department shown in the illustration below. This view shows but a small number of the many machines of this kind in the Holtzer-Cabot plant. Notice the clean, orderly arrangement in all of the different departments and the fact that ample natural light is provided by the spacious windows. It will also be noticed from these illustrations that machines of like kind are grouped

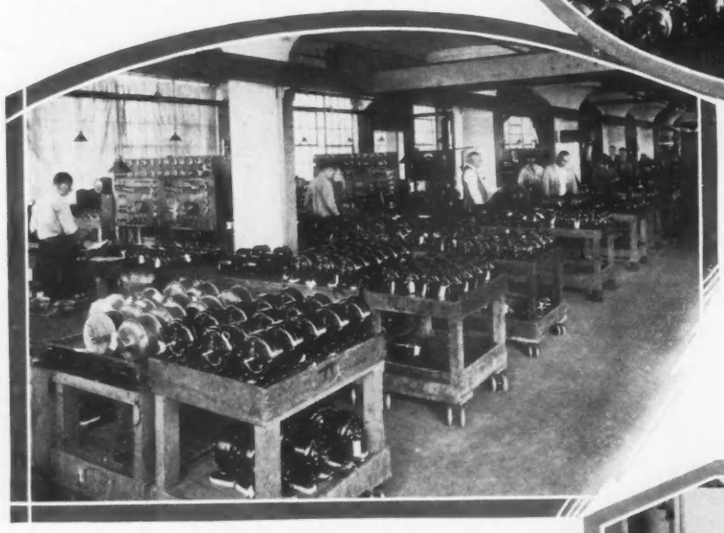
ONE of the most powerful presses in the Holtzer-Cabot plant is shown in the illustration at the right. This machine is used for forming the metal cases or boxes that are used with some of the signal apparatus constructed by this company. The operator is shown removing one of the metal stampings from the machine and others may be seen on the bench in the foreground



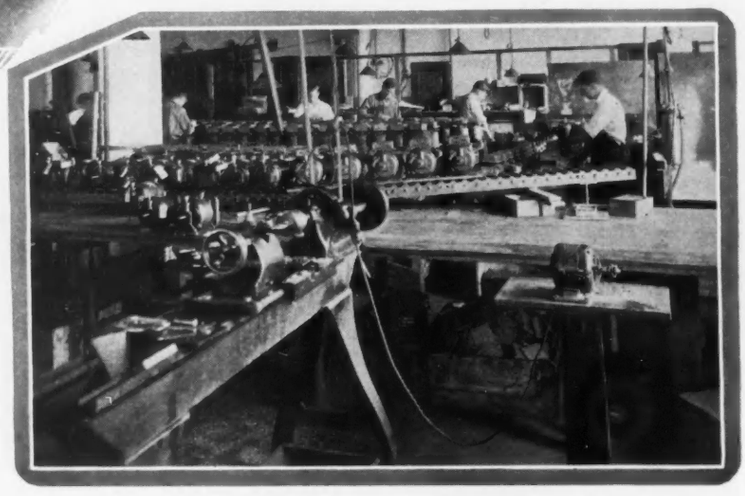
GRINDING plays an important part in the construction of electric motors in the Holtzer-Cabot factory. Every armature shaft is ground to very close tolerances by the battery of machines shown in the illustration above the circle at the left. Some of these machines are automatic in their operation and those of the older types are rapidly being replaced with modern equipment. Another of the interesting production operations in the manufacture of motor parts is shown in the view in the circle at the left. Here two large power presses are stamping core laminations from strips of sheet metal. These two machines work together, that in the foreground piercing the strips and the one at the left blanking the parts. It will be noticed that adequate safety devices have been provided on all machines of this type, and with these two presses there are attachments that feed the metal strips through the machines automatically, thereby insuring maximum production and safety for operators

IN the motor assembly department benches such as those shown below are provided. Each is assigned to one particular type or size of motor. Motor parts are brought from the production departments to the assembly benches by means of trucks, and the finished motors are placed on the portable trucks described elsewhere on this page. In the center of the illustration may be seen a motor of the larger type, some of which are still built. In addition to building motors, it should be mentioned that Holtzer-Cabot also manufactures airplane radio dynamotors, radio motor generators for naval vessels, and motor generators for signaling purposes. These are largely employed in fire alarm systems, the telegraph and other similar apparatus for transforming central station current to the special requirements of the apparatus

INASMUCH as practically all of the operations on coils and windings are comparatively light, many women operators are employed in the production of these parts in the Holtzer-Cabot plant. Directly above is another view in the motor winding room. Here are shown several different operations in the construction of motors. Notice the clean, light and orderly surroundings. Suspended on racks near the wall in the background are some windings for larger types of motors which are still produced in small quantities in this plant, but usually only on special order



PROGRESSIVE assembling equipment is being rapidly installed in the Holtzer-Cabot plant, as may be seen from reference to the illustration shown below. In this department the men at the left are putting the finishing touches on fractional horsepower motors. They pass to the workman at the extreme right, who places them in the spray finishing booth at his back, where they receive the final coat of finish before being shipped. After being painted they are placed on roller conveyors, which carry them by gravity to trucks for movement to the shipping floor



AFTER the motors have been completely assembled they are moved on the portable racks shown in the view above to the testing department. Notice the rows of benches, each of which is equipped with an individual test rack. In this department every motor undergoes a running test and a thorough inspection before it is accepted by the inspector as ready for service. Here again is evidence of the orderly manner in which work is performed in this plant. Everything has a place, and it is kept in that place until it is needed for use. In the views on this page is further evidence of the ample natural light that is provided throughout the entire plant. The floors are always clean, there are well-defined aisles and passageways, and the walls and ceilings are painted a light gray to reflect the light

An Outstanding Example of Motor Repair Shop Organization

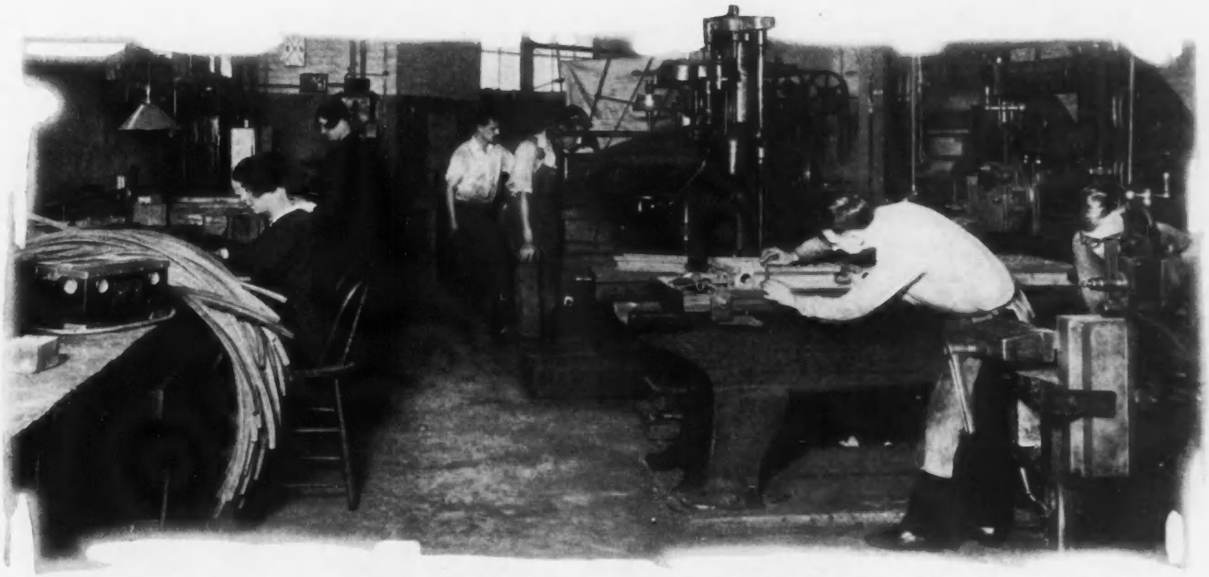
By William W. Baxter
Associate Editor, Electrical Manufacturing

IN ANY business today it is absolutely essential that accurate cost accounting records be kept. These must be as simple as possible and should contain sufficient data to indicate any and all charges for labor, materials and general operating expense. One such set of records is in use in the motor repair shop of the J. & H. Electric Company, 200 Richmond Street, Providence, R. I. Duplicates of them appear on the following pages with explanations as to how they are used.

IN the October and November issues of Electrical Manufacturing descriptions of the factory, facilities and some of the operating methods of the J. & H. Electric Company were published, together with a brief outline of the historical development of this organization. The J. & H. Electric Company, located at 200 Richmond Street, in Providence, R. I., conducts an extensive electrical contracting business; reconditions all kinds of electrical apparatus and at the same time manufactures the well-known D. & W. magnetic chucks.

In what follows as the concluding article of this series there are illustrations of the different cost accounting records employed by this company together with explanations as to how they are employed in the accounting for labor and materials. It will be noticed in this connection that each of the different forms bears a letter which was added in this case merely as a matter of identification in the explanation.

Form A—This is the workmen's time slip, one of which is made out by each employee every day. The slip bears the name of the employee and the number of the job upon which he has been engaged. Spaces are also provided in which he may record the number of straight time and overtime hours he was employed on the job. Under the heading "Class of Work" provisions have been made for the mechanic to set out just what work he actually performed on any one job. The column headed



As has been explained, the J. & H. Electric Company manufactures the D. & W. magnetic chuck. All of this work is carried on in the basement of the present factory. The view above shows some of the facilities available for manufacturing purposes. These include heavy machine tools and the necessary auxiliary apparatus, such as coil-winding equipment. Ample natural light is provided in the basement, and, as may be seen, the entire department is neat and orderly in its arrangement

Expense is used by the workmen in the field to cover transportation costs either by street railway or automobile.

Each workman's time is posed from the time slip upon a job record slip (Form F in this case) and the daily time slips are retained for reference in the main office for a period of six months after the job has been completed.

In addition to the foregoing each workman makes out at the end of each week one more time slip which is a recapitulation of the time entered on the daily time sheets. This is used as a check on the daily slips for payroll purposes.

Form B—The Record Sheet is used and is made out by the workman in the shop when a job is turned over to him for repairs. It contains the job number; the name of the customer; a full description of the job and notations of all repairs that are to be made. When the work is finished this report is checked against the job by the foreman, after which the Record Sheets are turned into the shop office for records of each job that passes through the shop.

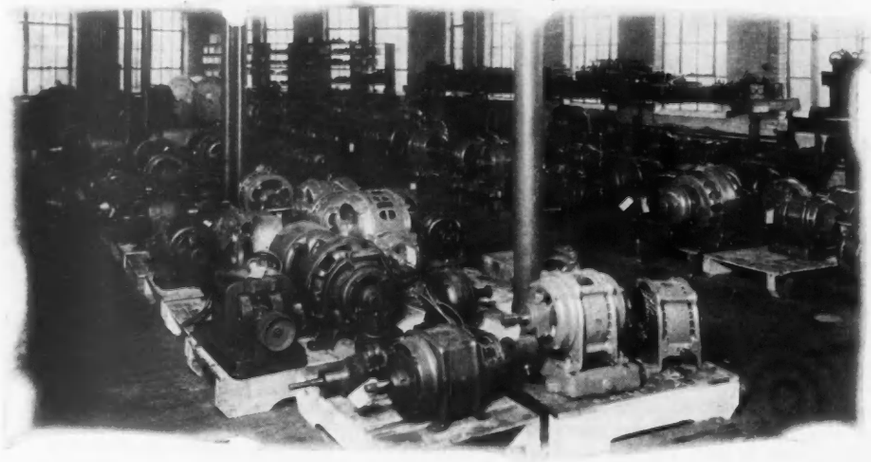
Form C—This is a form that is used when an estimated cost for repairs is supplied to a customer and when the work is not to be done until the price has been confirmed by the customer. The slip is forwarded to the main office in order that the estimated price may be transferred to the Record Sheet, (Form F in this case). The Memo Sheets are kept in the correspondence file until needed for reference.

Forms D-E-F-G—Comprise a complete set of job slips, including Record, Work, Filing and the Delivery Slip. These forms are printed in a flat fold combination whereby all copies may be made at the same time with the use of carbons.

When a job is received the Record Slip (Form F) is filled out as shown, indicating the customer's order number if one has been received and the Slip is sent to the main office where all of them are kept in numerical order until the various jobs are completed. All charges for time and materials are posted on this Slip in the main office and the reverse side of the Slip is ruled so that it can be used as a continuation of the front.

Form D—The Work Slip is placed in a heavy Manila envelope and is attached to the job until the work is finished. A description of the apparatus left for reconditioning is entered upon this form by the receiving clerk, together with the nature of the work to be done. When the work is completed this form is checked against the job by the foreman and the Work Slip is then sent to the main office where it is attached to the original Record Slip (Form F). The amounts on the Record Slip are then compiled and an invoice is rendered to the customer. In the case of work outside of the plant this Work Slip is kept on the job by the workman until the job is done, when the slip is returned to the office.

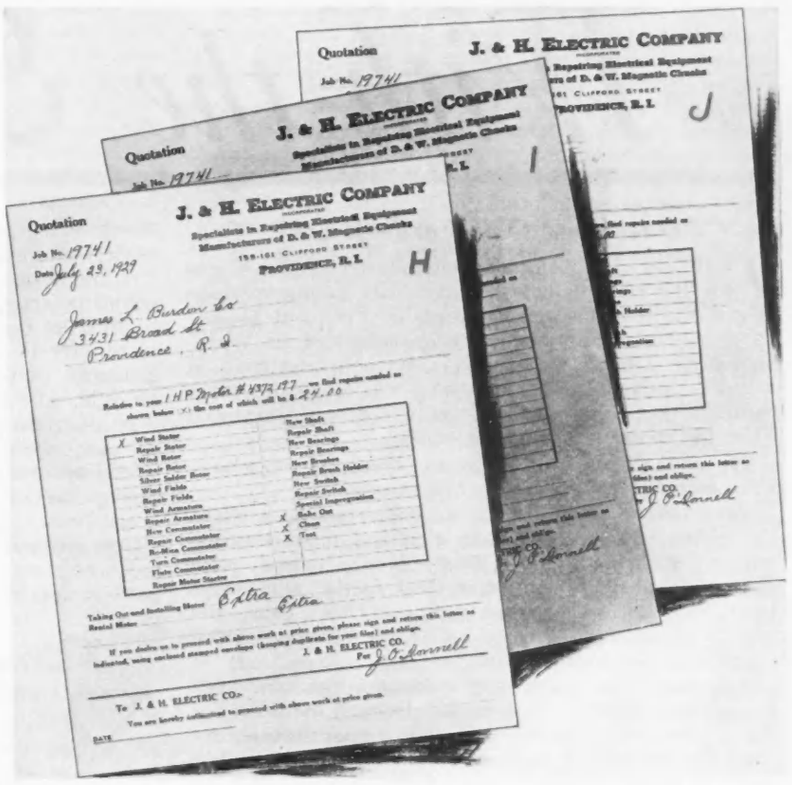
THE letters on the different forms shown above are only for reference purposes. Form A is the workmen's daily time report. Form B is a record sheet that is made out for every job. It contains full information about the job. Form C is merely a memorandum to the main office, containing estimates on work that has been brought into the plant but upon which no work has been started. At the right is a view in the sales room where all sorts of apparatus are stored



Form E—Is the reverse side of Form D and comprises a complete record of all work done for which the record is kept, all notations being made in the shop or in the field, as the case may be, by the workman performing the work.

Form G—This form consists of both a Filing Slip and a Delivery Slip, the former being used merely as a job record and the latter as a receipt for delivery. However, this form is being changed so that both the Filing Slip and the Delivery Slip will be upon separate sheets, both being carbon copies of the original Record Slip. When job numbers are assigned the Filing Slips are held in the shop office and at the end of each day are turned into the main office where they are filed alphabetically in an open job file. When the Work Slip on the completed job reaches the main office the Filing Slip of the corresponding number is placed in the alphabetically arranged closed job file. The Delivery Slips are filed in the same manner in the shop office with respect to open and closed jobs, with the exception that when a job is returned to the customer the Delivery Slip is receipted.

All records of completed jobs are filed numerically and are kept in files for periods of about three years.



Forms H-I-J—These comprise one set of Proposal Forms that are used when a customer has left work for repairs and wants an estimate of the cost before the work is started. These forms are filled out by the shop foreman with a job number indicated thereon. All work to be done is checked in the column at the left of the sheets. A price is placed on the work and if there are any extra charges they are also noted. Original and duplicate copies are both sent to the customer with the request that he approve and return the original if he desires that the work be performed at the price quoted. The duplicate copy he can keep for his records and the third copy is retained in the office until the job is closed.

pairs and wants an estimate of the

These, with the exception of the forms used in the main office, comprise the shop records.

FORMS D-E-F-G comprise a complete set of job slips, including Record, Work, Filing and Delivery Slip. They are printed in a flat fold combination so that all copies can be made at one time with the use of carbon paper. Those above are Forms H-I-J, which make up one set of Proposal Forms. These are used when a customer leaves work in need of repair and wants an estimate on the cost before the work is started

With the Editors

"One Good Old Word—Work"

IF the electrical manufacturing industry needs a slogan for the present and the immediate future, perhaps it can find it in the closing words of President Hoover to the 400 business leaders who assembled in Washington on Dec. 5 to form a permanent economic or business council whose purpose it will be to prevent a business depression such as that which was threatened after the recent stock market crash.

He said: "I have no desire to preach. I may, however, mention one good old word—work."

And "work" is the theme of many messages which the editor has received from electrical manufacturing executives during the past thirty days. In reply to a query, "What effect will recent stock market movements have on electrical business now and next year, and why?" the answer seems to be, "Little effect, provided everybody goes back to work."

Apparently there is nothing unsound in the basic business of the country. Nor of the electrical industry, for that matter. An electrical refrigerator manufacturer reports that orders are running 50 per cent ahead of last year. A leading appliance manufacturer replies that its thousands of distributors throughout the country have no inventory problems such as they had in 1921. His company is behind in its deliveries and is enjoying a record-breaking sales volume. A wiring device manufacturer expects a larger volume of business for 1930 than for 1929. A radio manufacturer declares that the great army of people who are now in the market for radio were never in the stock market. Other manufacturers report a speeding up of sales effort with the confident expectation that next year's sales will equal those of this year. Electrical contractor-dealers are expecting that money will return in quantities to building projects, and that increased installation business will yield a substantial return to them and to wholesalers and manufacturers as well.

Forget the stock market and go to work is the slogan of the hour.

Go West, Young Company, Go West

IN the editorial comment which followed President Hoover's message to Congress, emphasis was laid on a fact that strikes one with surprise and force. It has been customary almost throughout our national life to think and speak of Minnesota, Wisconsin, Kansas and Missouri as essentially agricultural states, so agricultural, in fact, that any other interest was of secondary and small importance. Now comes the news that the gross farm production in these four states is exceeded by the gross industrial production. And also, agriculture leads industry by only a small margin in Iowa and Nebraska.

This news indicates that industry is still marching westward, that manufacturing is outstripping agriculture because the increasing population wants more manufactured than farm products and because it demands manufactured goods in greater volume than that which can conveniently and profitably be shipped from the older eastern manufacturing states. It means also that this growing population will develop wants in increasing variety and quantity as the years roll on.

It might not be amiss, therefore, to suggest to the new company struggling against hard competition in the East to turn its thought westward. And if Horace Greeley were alive he might be heard to say, "Go west, young company, go west." Reasons for such a migration are twofold, at least. New and younger companies are needed in the great Middle West, and such companies are particularly needed in the industrially congested East. Certainly, many a young and rising electrical manufacturing concern will do well to consider thoughtfully the possibilities of its future growth in the states mentioned above, the heart of the Middle West, which must under increasing economic necessity continue to become even more industrial than it is at present.

Tame the Wild Speaker

NEW YORK CITY officials recently made a study of objectionable noises, noises which might later be stopped by municipal action. Listed first among such noises was the loudspeaker racket let loose on a long-suffering public by the retailers of radio receivers. No qualification was made in behalf of the good loudspeaker as against the poor one. The practice of dealers in turning loose a flood of noise from speakers in windows or above store entrances was condemned in toto. It is expected that the city will take action to stop this practice along with others that produce equally objectionable results. Apparently the time has come to sell radio receivers by sane rather than insane methods. If radio manufacturers are as wise as they should be, they will tame the wild speakers that their distributors may be using in an effort to sell the manufacturer's products.

Build a Supply of Trained Men

TECHNICALLY trained young men qualified to serve either as department heads or as mechanics are needed today in the electrical manufacturing field in greater number than ever before. Their scarcity has at times embarrassed certain manufacturers, and instances are on record in which their lack has interfered seriously with production.

Where are such young men to be found? For years American industry drew upon the labor markets of Europe for its trained craftsmen, but the immigration laws have cut down this supply. Various industries have established apprenticeship schools wherein young men receive the necessary fundamental training to fit them for positions in the supporting industries, but there has not been sufficient training of this kind to increase the number of skilled men to any great extent. Trade schools have done well in their way, but their graduates too often need much additional training to make them technically expert as workmen or executives.

As conditions now stand there seems to be only one answer, and that is for the manufacturer to train his own men. The larger electrical manufacturing concerns have been doing this for years. Some of the smaller companies have attempted it, on a smaller scale, of

course. And unless these companies are suddenly to find themselves facing a serious shortage of trained men when plans are made for expansion, they must continue to train men for skilled or technical work. Certainly it would not be amiss for electrical manufacturers to pool their experience in training men and to consider the possibility of cooperative action aimed to increase the supply. By all means, let the smaller manufacturer keep alive to his need for technically trained executives and workmen, and plan to fill that need before the day when a scarcity of such men may seriously handicap his business.

Fewer Hours, Not Lower Wages

ANNOUNCEMENT that an eastern electrical manufacturing company will hereafter operate on a five-day week, and that the 800 employees will continue to receive the same wages heretofore paid for the forty-eight hour, or six-day, week, provides plenty of food for thought for the executives of other electrical manufacturing concerns.

Just what prompted the company to make this change at this time is an interesting question. It may be that increased efficiency and greater production are expected to result from the shorter day. It is said that ever since the company was organized, nearly forty years ago, the number of working hours per week has steadily decreased, and that in each case the resulting production has either been equal to or greater than that of the longer week displaced. It will be interesting to discover how long such a record can be maintained.

Whatever the reasons for the change may be, however, it seems to be entirely in line with the economic philosophy, the sound common sense, laid down by President Hoover in his recent business conferences at Washington, emphasizing the necessity for maintaining employment and wages, at this time, as vital to the existence of a strong consumer buying power. No one in the electrical manufacturing industry wants to see the buying power of its employees reduced. Reduction in working hours seems the wiser step, if even that is necessary.

Foreign Trade? Certainly!

MANY times in the history of American business it has been evident that even a slight falling off in sales in almost any industry brings out a new emphasis on the value of the foreign market as a possible means of adjustment. The present business situation is not an exception. In the conference of business leaders in Washington on Dec. 5, President Hoover, Julius Klein, and other speakers stressed the opportunity for manufacturers to push their sales effort into the foreign market. What these leaders said deserves consideration by electrical manufacturers who may be interested in markets overseas.

President Hoover pointed out the fact that in stimulating our foreign trade we should be interested mainly in development work, such as roads and utilities, because of its power to raise standards of living and thereby open up markets for the vast variety of goods from every nation.

Mr. Klein urged manufacturers to undertake export programs with sobriety and every possible precaution. Above all things, such programs are not to be undertaken on a casual or temporary basis nor should they take on the remotest semblance to a dumping campaign. He stressed his belief that our trade growth in the future, as in the past, is likely to be predominantly in the field of our specialized products.

"There is clearly greater stability and more general employment in Europe, where half of our exports are sold. The lowering of money rates following the excesses of speculation are encouraging foreign investments and therefore increasing exports," said Mr. Klein. "Just as England laid the foundation of her far-flung export activities by her huge foreign investments, so we today can assure the maintenance and further development of our foreign trade through the legitimate and constructive acceleration of these foreign holdings. Many of our investments in foreign public utilities and industries are reflected in our exports of material and equipment. The indirect effect in building up exports is even greater."

After the painful experiences of American manufacturers who rushed blindly into exporting effort following the depression of 1921, it is unlikely that many electrical manufacturers will repeat the mistake. At the same time, these manufacturers should not overlook the very real value in a substantial volume of foreign trade carefully planned and developed as a long-time effort, as a permanent part of their business. In many industries there can be found manufacturers whose efforts to develop foreign sales have been splendidly rewarded. Business of this kind can be built up, but not by men who are ignorant of foreign markets and foreign methods of doing business. There is profit in the foreign market for the American electrical manufacturer who puts brains rather than guesswork on his payroll, and who utilizes the many facilities at his command to assist him in his sales effort abroad.

Simplified Net Prices Wanted

CONTRACTOR-DEALERS everywhere will welcome simplified net prices on the materials which they buy, install and sell, according to a letter which the editor has received from a successful contractor located in the Middle West. He writes as follows:

"Will you make an appeal to manufacturers and wholesalers for a simplified net price on the material and appliances which we buy, so that we can price our merchandise properly? Price lists are becoming more and more complicated every month, and it is getting harder and harder for the contractor-dealer to arrive at the net cost of practically any item he handles. These complicated price lists may suit the purpose of the wholesaler, but they hamper the dealer who must depend on an ever changing personnel in his organization, new men who must receive, put away, and price materials.

"The chain discount method does not fit into modern merchandising practice any more than would a push-cart to deliver our merchandise to our customers or to a job. Our industry is trying to survive the handicap of uncertain and indefinite retail prices on too much of its merchandise. No two contractor-dealers in the country use the same set of retail prices or use the same method of arriving at them for lack of a ready way of knowing their costs on which any intelligent retail price must, of course, be based.

"We accept the present schedule of discounts as established by manufacturers and distributors on appliances of certain classes and sell these goods at list and hope we are making a profit. I am satisfied with this margin on the well-known staple items on which we know the volume, but I never could figure out why some dealers persist in experimenting with new and untried lines of merchandise covered all over with a multiplicity of prices determined, if possible, under a mess of discounts."

Certainly here is a subject for careful thought by manufacturers and their distributors who are now laying plans for 1930 sales efforts.

Applications of Adjustable Speed Motors

Variable speed motors, and particularly those intended for use with direct current, are used for many types of drives in industry

By C. E. L. Dapprich
Westinghouse Electric & Mfg. Co.

IN ALMOST every industrial plant there are appliances or machines which require adjustable speed motors for their most successful and economical operation. Taking the definition of an adjustable speed motor from the A.I.E.E. standards: "An adjustable speed motor is one the speed of which can be varied gradually over a considerable range, but when once adjusted remains practically unaffected by the load, such as a shunt motor designed for a considerable range of speed variations." In addition to the direct current shunt wound motor with field control there are various types of alternating current commutator motors on which the speed can be adjusted by shifting the brushes.

Although these alternating current types have been on the market for some time, both here and in foreign countries, they have so far attained only a minor commercial importance. Furthermore, the activity on these A.C. motors has been principally in foreign countries. Their use has not been restricted by any pronounced shortcomings in operating characteristics since their speeds can be adjusted quite as well, and their speed regulation is about as close, and the available speed range is almost as great as on the corresponding direct current motor. The difficulty seems to lie principally with their high first cost. This article will therefore concern itself only with that type which has by far the highest activity and widest distribution, namely, the direct current shunt wound adjustable speed motor.

The outstanding operating advantage of the adjustable speed motor is the ease and economy with which its speed can be adjusted. By merely changing the setting of a rheostat which carries only the relatively small field current of the motor, the speed on a properly designed motor can be increased in the ratio of 3 or 4 to 1, and under certain favorable conditions can go to even higher ratios. If, in addi-

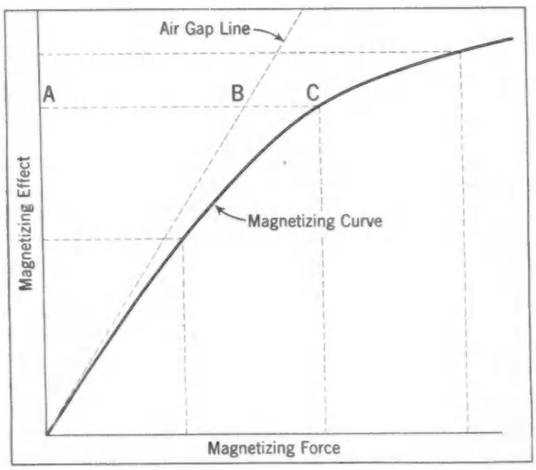


Figure 1

A chart showing the proportion of magnetizing force that is taken up by the air gap of the motor and that taken up by the iron in the motor

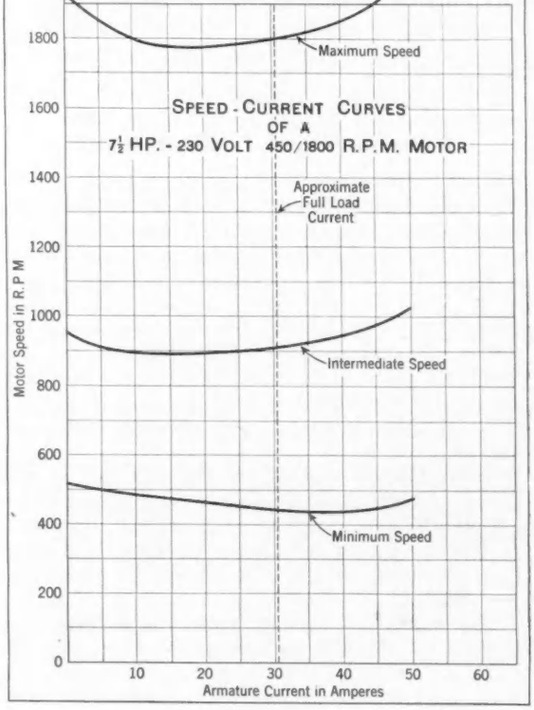


Figure 2

Some typical characteristic speed curves, or speed current curves, as they are usually designated, of an adjustable speed direct current motor

tion to this, the voltage impressed on the armature is suitably varied, the speed range can be extended to 8 or even 10 to 1. The field current being so small, as compared to the armature current, its value has practically no effect upon the motor efficiency, that is, it does not make much difference whether the full field current or only a reduced current is flowing in the field coils, as the efficiency will be only slightly affected.

Due also to a general redistribution of losses in the motor with change in speed it is found that the efficiency is pretty nearly constant over the whole range of speed obtained with field control. This is quite different from speed control with armature resistance, where the efficiency goes down with the speed and which has, in addition, the drawback that this method of regulation gives the motor varying speed characteristics. Expressing this in another way, when using armature resistance an increase in load will reduce the speed materially and conversely a decrease in load will increase the speed materially. This is a rather undesirable effect which makes it necessary to operate a motor with armature resistance on a load which has a constant torque. Depending upon the number of steps provided in the field rheostat and the distribution of the resistance between contacts, the speed changes can be made as gradual as desired.

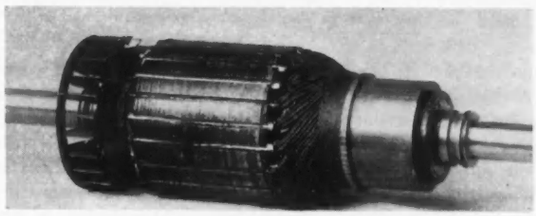


Figure 3

The complete armature of a small adjustable speed motor rated at ¾ hp., 600 to 1800 r.p.m. In this armature the punchings and commutator are assembled directly on the shaft

Standard field rheostats may have as few as 20 to as many as 66 or even more field contacts.

When considering the operation of an adjustable speed motor it quickly becomes evident that the speed of any direct current motor is dependent upon the amount of magnetism passing through its armature. If this amount is decreased then the armature must revolve faster in order to generate the same counter-elctromotive force as before and conversely if the amount of magnetism is increased then the armature must rotate more slowly.

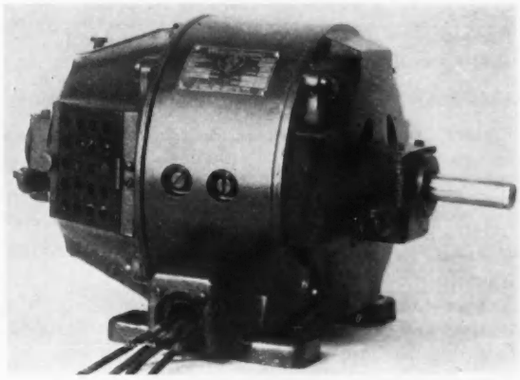


Figure 4

A complete adjustable speed motor with semi-enclosing covers on the front of the commutator bracket. The motor has two main poles and a commutating pole

This fact may be presented in the form of an equation thus:

$$R_s = \frac{(E\text{-}IR)\ 10^8}{W.P.\ \phi}$$

where R_s = Revolutions per second
E = Impressed voltage
IR = Voltage drop in motor
W = Wires in series on armature
P = Number of poles
ϕ = Flux per pole

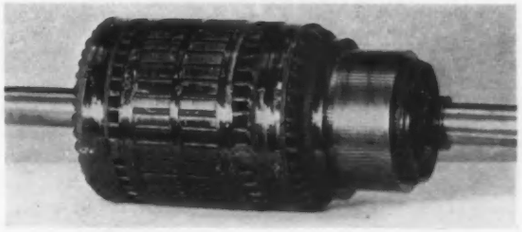


Figure 5

A complete armature of a medium size adjustable speed motor using punchings with open slots in which form wound coils are placed

For any given machine W and P are constant, hence, if the speed is to be changed, the value of ϕ must be changed. The change in speed is, however, proportional, inversely, to the change in flux, that is, if ϕ increases, then R_s decreases, and if ϕ decreases, then R_s increases. This relation is the basis of the speed adjustments made by field control on an adjustable speed motor.

The amount of magnetism or flux in a D.C. motor can be increased by allowing more current to flow in the shunt field. However, although the magnetism increases with the increase in field current, it is not directly proportional to it except approximately so at the lowest values. Conversely, a decrease in field current causes a reduction in the magnetism of the machine, but, just as before, there is no fixed proportionality except possibly at the lowest values of current and magnetic effect.

The typical curve in Figure 1 shows this condition in a more graphic way. The dotted line indicated as the "air-gap line," shows what proportion of the magnetizing force is taken up by the air gap of the motor. The length, AB, indicates what proportion is taken by the air, and the length, BC, indicates the proportion of the magnetizing force that is required for the iron parts of the magnetic circuit. From this magnetizing curve it can be seen that as the magnetizing force in the magnetic circuit or, say, in the motor, is increased, the magnetic effect, or magnetism, is also increased. But it is also evident that as the magnetism is further increased, then, just as before, the gap only takes a proportional part of the magnetic force expended, but that the iron takes a larger and larger proportion of this force. This latter effect is due to the so-called "saturation" of the iron.

With the speed dependent upon the magnetism which, in turn, depends upon the magnetizing force or motor field current, this furnishes a ready means of getting whatever speed we desire within the operating limits of the machine.

The curves in Figure 2 show some typical characteristic speed curves, or speed-current curves, as they are usually designated, of an adjustable speed direct current motor. The speed-range on this machine at the normal voltage of 230 volts is 450 to 1800 r.p.m. This means that any speed from 450 up to 1800 r.p.m. can be obtained by merely adjusting the field current to the proper value. The horse-

power obtainable from this motor is constant over the entire speed range.

Although for the sake of clearness the speed-current curves for only three speeds are shown in Figure 2, there are, actually, any number of speeds available between the limits of 450 to 1800 r.p.m. Depending entirely upon the number of possible adjustments of field current, i.e., upon how many contacts are available in the field rheostat, we can obtain that many different speeds.

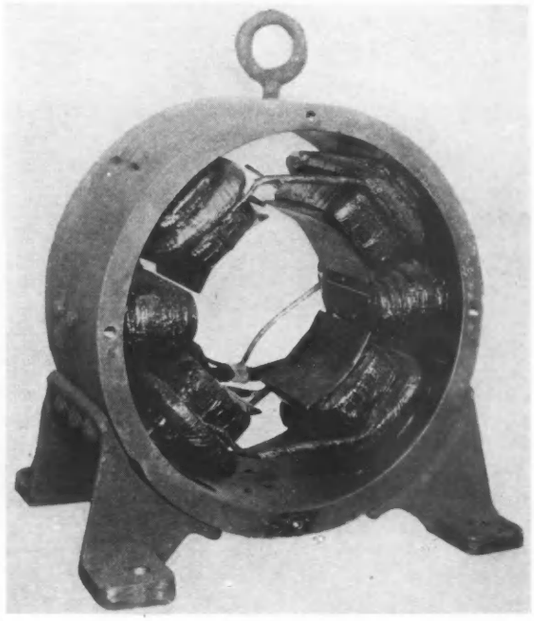


Figure 6

A complete frame with poles and coils of a medium size, adjustable speed motor. The yoke ring is made of rolled steel welded together and the feet are forgings that are riveted to the yoke ring

In scanning the curves shown in Figure 2, it will be noticed that the inclination and shape of the various curves differ. The "minimum" speed curve, in going from no load to full load, descends gradually and as a straight line until a considerable overload is reached. It then rises gradually along a curved line. The "intermediate" speed curve initially descends more abruptly than the minimum speed curve did, but as the load increases, this curve flattens out and runs parallel to the current axis almost up to the full load condition before it bends upward. The "maximum" speed curve has initially an even more pronounced initial droop and the following flat portion of the curve is shorter, which means that this curve turns upward sooner than the other curves did. As the load on the motor increases, there are two tendencies which manifest themselves—a decrease in speed, due to increased voltage drop in the motor—also an increase in speed, due to the obstructing or reducing effect of armature reaction upon the main flux or field of the motor.

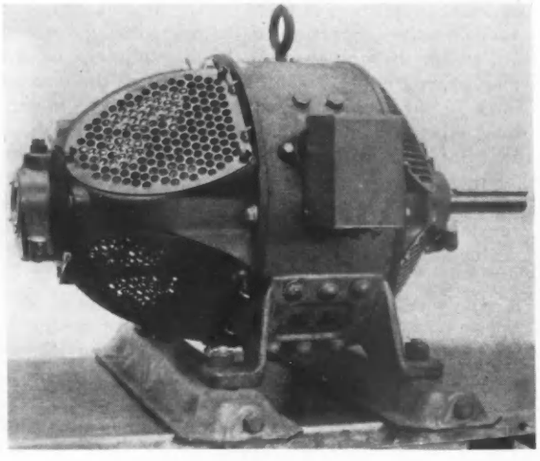


Figure 7

This is another typical adjustable speed motor with semi-enclosing covers having a conduit box attached and the slide rails are manufactured from pressed steel

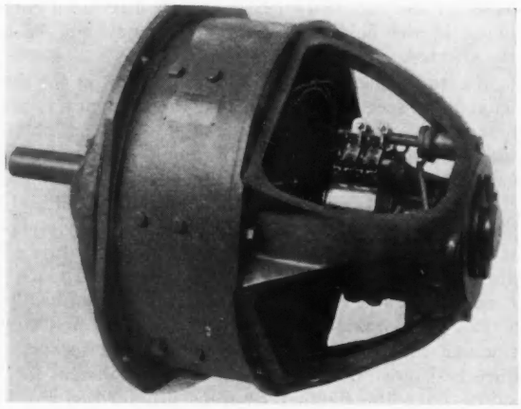


Figure 8

An adjustable speed motor arranged for flange mounting. The flange has a finished surface that may be bolted against a machine and held in place with four bolts

Applications of Adjustable Speed Motors

Shunt Wound Motors

- Individual machine tool drives
- Paper and textile machinery drives
- Fans
- Pumps
- Geared elevator service

Compound Wound Motors

- Punches
- Shears
- Presses
- Rolling mill machinery

Series Wound Motors

- Electric railway service
- Hoists and cranes
- Rolling mill drives

Some Specific Applications of Adjustable Speed Motors

- Conveyor service
- Electric shovels
- Rubber calendars
- Planers and boring machines
- Grinding machines
- Pipe cutting and threading
- Tube cutters
- Draw benches
- Roll lathes

Characteristics of Insulating Materials for Power Cables

The Third of a Series Discussing Power Cable Manufacture

This article concludes the discussion of the characteristics of varnished cambric cables and takes up the properties of impregnated paper insulation

By E. W. Davis
Simplex Wire & Cable Company

HIGHLY important to the electrical engineer of today are the problems concerning the characteristics of insulating materials for power cables. Essentially there are three materials generally in use as insulation. These are rubber, varnished cambric and impregnated paper. In the first installment of this series the characteristics of rubber were explained. This was followed by a discussion of the properties of varnished cambric and this subject is continued in what follows, together with an explanation of the advantages of impregnated paper as an insulating material for power cables.

Varnished cambric cables, due to their ability to withstand ozone and due to the fact that they are not very easily overstressed, are quite suitable for high tension work and are very frequently used wherever a short or moderately long run of cable is desired.

Varnished cambric cables are installed more easily than paper cables, can be bent to a much shorter radius and are less liable to injury in jointing.

Exposure to moisture for a moderate length of time does not seriously affect a varnished cambric cable. It is not necessary that a cable of this type have a moistureproof covering. With weatherproof or flameproof braid, varnished cambric cables are frequently used in exposed locations where the operating voltage or temperatures are above the limits where it is advisable to use rubber.

Figure 10 shows the effect of temperature on the dielectric strength of varnished cambric. While the drop in dielectric strength is small, it is nevertheless one of the limiting factors in the employment of high voltage varnished cambric cables.

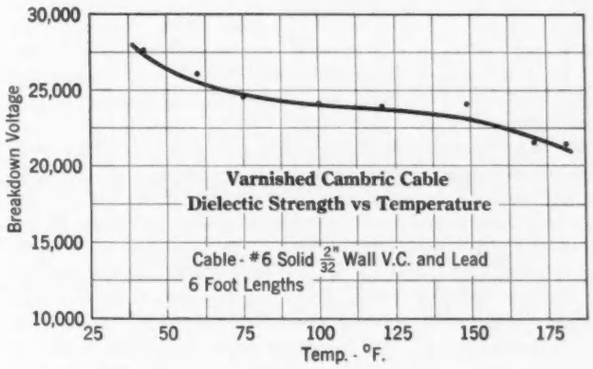


Figure 10

The effect of temperature on the dielectric strength of varnished cambric. While the drop in dielectric strength is small, it is one of the limiting factors in the use of high voltage, varnished, cambric power cables

Probably the most limiting factor of the use of varnished cambric insulation is the increase of power factor and dielectric loss with temperature or voltage stress. This may cause a rise of cable temperature with consequent decrease of allowable current carrying capacity.

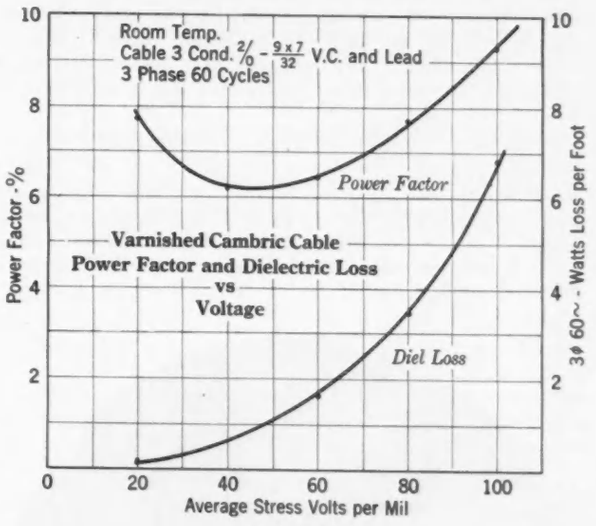


Figure 11

The effect of voltage on the dielectric strength and power factor of varnished cambric. Probably the most limiting factor in the use of varnished cambric lies in the increase of power factor and dielectric loss with temperature of voltage stress

Figure 12

Effect of Temperature on Varnished Cambric Sheet Samples

	As received	After 187 hrs. at 100° C.
Resistivity—M.O. per inch cube.....	300 x 10^6	1200 x 10^6
Dielectric constant	2.7	2.3
Power factor—60 cycles—2000 volts.....	7.9	5.4
Dielectric strength—Volts per mil.....	850	600
Tensile strength—Lbs. per sq. inch—with..	4470	8053
across	2520	6083
Tear—Gms. per mil—with.....	17.8	8.07
across	20.7	12.78

Tests at room temp.

Figure 12 shows the effect of prolonged temperature on the electrical and mechanical properties of varnished cambric. It will be noted that while there is some improvement in resistivity, dielectric constant, power factor and tensile strength, there is a marked decrease of dielectric strength and tearing strength.

In summation, varnished cambric cables have:

a—Low resistivity but high dielectric strength
b—Medium low electrostatic capacity
c—High dielectric loss and power factor
d—Drop in dielectric strength as temperature increases
e—Can withstand effect of ozone
f—Withstand effects of surges and system disturbances
g—Readily installed under almost any conditions
h—Simplicity of joints in varnished cambric insulated cables

Impregnated Paper Cable—For some years the subject of high tension paper cables has been receiving considerable attention and publicity in technical circles. At first this was caused by the realization that greatly desired increases in distribution and transmission voltages were dependent on high tension paper cable development. More recently, this attention has been attracted by the remarkable improvements in such cables—improvements that have been made possible by the hearty cooperation of the engineers of the cable manufacturers and the power distributing companies.

For many years there has been much discussion of the relative merits and demerits of manila rope and wood pulp papers as used on high tension paper cables. Foreign cable manufacturers have insisted that cables with wood pulp paper are equal, if not superior, to those insulated with manila rope paper.

American experience to date seems to indicate that electrically speaking, this opinion of the foreign cable makers is one based upon fact and not theory. Tests made in our own research laboratories would indicate that when properly treated with paper cable impregnating compounds, some wood pulp papers will have insulating properties (such as dielectric loss, power factor, dielectric strength and permittivity) equal if not better than those for the best grades of manila rope paper. On the other hand, because of the variations in the natural construction of wood pulp fiber and because of the variations in the processes through which these fibers are put during the manufacture of the papers, unless great care is used in selection of wood pulp papers for cable work, disastrous results may follow. Wood pulp papers are almost invariably more dense than manila rope papers, and hence cables made up with wood pulp papers must be treated differently during the process of impregnation in order to assure the best results.

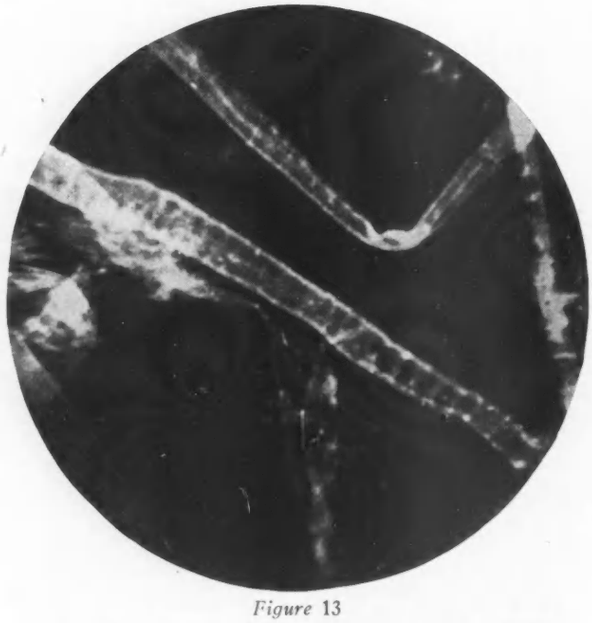


Figure 13

A reproduction from a microphotograph as reduced from typical cable papers. This is made from wood pulp. In the live wood the pits are kept from being open holes by a wall of cementing material binding the fibers, but this material is removed in the process of making the paper

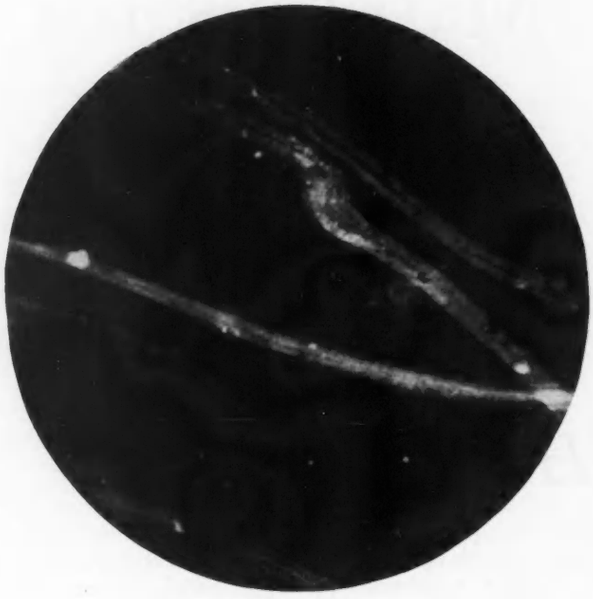


Figure 13A

A reproduction from a microphotograph showing the fibers in manila rope paper. Manila fibers are much smaller, as may be seen by comparison of this illustration with Figure 13. *Manila rope fibers are nearly round, rather thick-walled and are comparatively smooth. In the natural state the fibers are bodkin-shaped and closed at both ends, with a central canal running nearly to the ends*

It is a quite generally accepted theory among cable engineers, designers and research men, that cables insulated with high density paper will have higher dielectric strength than those insulated with lower density paper. This, however, is only a fact when both types of cable have equal impregnation or when both types of cable are thoroughly saturated with impregnating compound. Because of the high density of most wood pulp papers, cable manufacturing processes must be altered to assure complete impregnation.

In some respects, mechanically, wood pulp papers are not so strong as manila rope, especially resistance to tearing when saturated with oils. This means a possibility of torn paper tapes when the cable is subjected to the very severe bending tests of American specifications. In fact, tests made on samples of foreign cables installed by some of our American public service corporations have shown that the majority of the cables were insulated with wood pulp papers and that the cables would not pass the normal American bending test. Tests on the paper strips taken from these cables showed an abnormally low tearing test.

This history of cable impregnating compounds is one of great interest. The compounds of fifteen years ago consisted of mechanical mixtures of rosin, rosin oil, and dirt, the latter material not introduced purposely into the compound but being rather the result of the clumsy and unscientific method of handling compounds. The dielectric

loss and power factor of these cables was very high, the insulation resistance extremely low and the capacitance enormous. The dielectric strength of such cables, however, was high—and cables made to operate on the then existing voltages gave very satisfactory service.

Soon after this period, the subject of dielectric loss and power factor received the concentrated attention of engineers and scientists, and a demand was made on the cable manufacturer for a product with low dielectric loss and power factor. The result was the elimination of both rosin and rosin oil and the use of petrolatum grease or compounds of which petrolatum grease was the base. These compounds resulted in cables having extremely high insulation resistance, very low dielectric loss and power factor, and a dielectric strength slightly lower than cables impregnated with the rosin compounds.

As voltages increased to 25 kv. and 33 kv. and even down to voltages as low as 13 kv., it has been found that these petrolatum compounds are not stable, that in many cases the compound disintegrates forming a fibrous substance often called "wax" or "cheese" or X. Many cables that have failed in service have shown unmistakable signs of this compound disintegration—and at one time this was pointed out as the cause of the cable failure. On the other hand, it is more than probable that if the compound disintegrates due to stress in one part of a cable system, it disintegrates in all parts of the system, and that while some few lengths of cable have failed, been taken out of service and found to contain very much "wax," "cheese," or X, it is also more than probable that the remaining sections of cable which are giving satisfactory service contain an equal amount of X.

This condition has led to the development of so-called "non-waxing" compounds, compounds that theoretically are chemically stable under the action of electric stress.

Research work in our laboratories has convinced us that the disintegration of cable impregnating compounds is due to the presence of voids in the cable insulation. We have found that X may be formed with practically any known impregnating compound today, providing the tests are so made that there are voids in that part of the compound subjected to stress. We have found that for any compound, if the voids be eliminated, the formation of wax is halted.

The result of this has been the development of compounds in which voids are not readily formed. Because of the nature of the material, petrolatum grease is particularly subject to void formation. Expansion and contraction of the material due to temperature, together with the solidity of the material at temperatures below 125 deg. Fahr., result in the wax formation in cables impregnated with petrolatum grease. It is barely possible that there would be less wax formation in such cables if the operating temperature throughout the wall of cable insulation could be kept above the melting point of the grease, although this is a matter that has not been definitely proved.

Mineral oils are now being employed as cable impregnating compounds. Because such oils always remain in the liquid state and are free to flow from one point to another, it has been assumed that voids would not be present in the wall of insulation, that as soon as a void was formed due to the rearrangement of the cable materials during installation or during natural expansion and contraction with temperature, that there would be an immediate influx of the oil, sealing up the void and equalizing the compound pressure throughout the insulation.

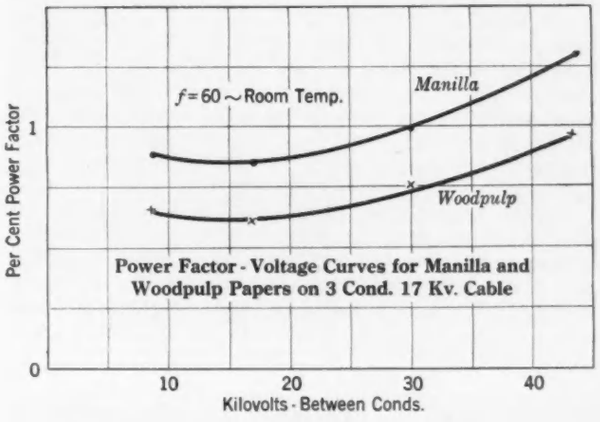


Figure 15

A comparison of the characteristics of both wood fiber and manila fiber papers showing the power-factor-voltage curves on a three conductor 17 *kv-a. cable*

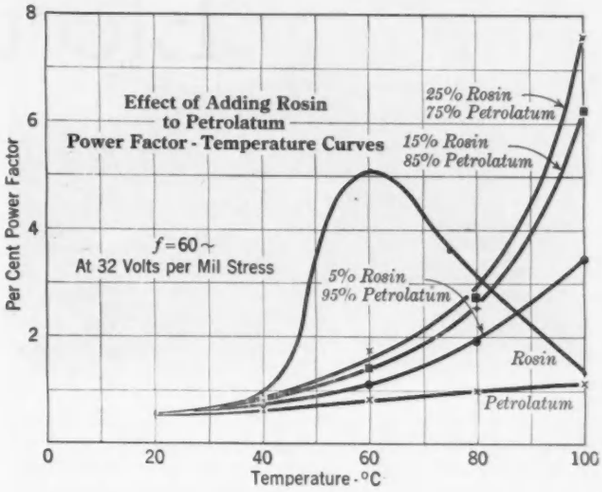


Figure 16

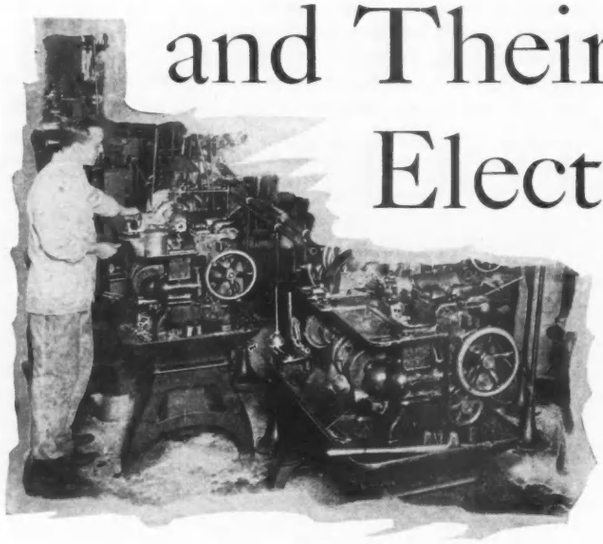
Curves showing the effect on power factor, temperature curves for petrolatum, rosin and combinations of the two. That for petrolatum is typical for a high-grade grease. That for rosin is peculiar in shape and holds true for most commercial grades of this material, while the curves for the various mixes of petrolatum and rosin show a marked increase in power factor with an increase in the percentage of rosin

It has been discovered, however, that voids are not always due to rearrangement of the insulating materials but may be formed by the mechanical action of the electric stress separating the films of oil from the paper tapes. Mineral oil compounds containing a small percentage of rosin have been found to be particularly free from wax formation, especially when actually used in cable as impregnating compounds. This may be due to the fact that the rosin increases the surface tension of the compound, so that the action of the electric stress cannot separate it from the surface of the paper and hence cannot form the void.

The impregnating compounds used on most of the super-voltage cables installed in this country are of the nature and viscosity of transil oil. We have not any time or space in this short paper to discuss merits or demerits of such oils as impregnating compounds. It has been quite generally assumed that for these super-voltage cables, thin oils were necessary to assure satisfactory operation. It is worth while to note, in passing, however, that one of the foreign cable manufacturers has made up a sample of the single conductor 132 kv. cable using the normal European rosin and rosin oil compound and that this cable is standing up under the severe test service.

(To be concluded)

Screw Machine Products and Their Uses in the Electrical Industry



No. 18 of a Series of Articles on Common Materials

By William Crawford Hirsch

NO PRODUCTS are more typical of the American genius for mass production than the myriads of electrical parts formed by the automatic screw machine from metals of all sorts. When you see precision products, such as metal inserts for porcelain or molded insulators—useless, if a mere thousandth of an inch too small or too large—issuing from automatic screw machines at the rate of one finished insert every second, you cannot help but marvel at what has been accomplished in this process by way of pairing lightning speed with unfailing accuracy.

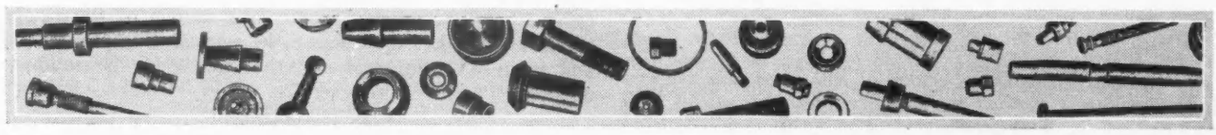
The designation of screw machine for the type of many-sided mechanism known by that name today is an awkward legacy from the pioneer days of the machine tool industry. In fact the equipment used today in the manufacture of the common garden variety of standard machine screws differs materially from what are commonly known as screw machines which have a much wider range of usefulness. The modern, automatic screw machine has been aptly described as a super-mechanism which permits the use of a dozen or more tools that are attached to the turret face, and each of which performs a specific operation in shaping the product, such as drilling large and small holes, chamfering, shaving, reaming, tapping, knurling, etc.

These attachments may be divided into (1) standard attachments for the ordinary secondary operations after the piece has been parted from the bar, such as slotting, burring, index-drilling, etc., and (2) special attachments for re-chucking and finishing, usually with a magazine providing continuous supply of the parts. The most frequently seen attachment in the first-named class is that for putting the screw-driver slot into the head of the screws, which can also be used for light milling operations. Index-drilling attachments are used to drill one or more holes crosswise of the piece. Burring attachments serve to remove the burr left by the cut-off tool, thus eliminating the necessity of a subsequent manual operation for that purpose. All these attachments are applied to the front of the machine, and as the pieces are parted from the steel bar or brass rod, an arm picks them up and transfers them to the attachment where the secondary operation is carried out without interfering with the main operation of the machine.

The economy of the second class of special attachments depends entirely upon the quantities of parts to be produced. The ingenuity of screw machine design makes possible many short cuts which, however, entail a sufficiently important investment in the necessary attachments to make them profitable only when quantities and prospects of repeat orders justify this first cost.

Many parts cannot be finished complete in one operation, but with another handling they can be re-chucked in the machine and finished. Efficient magazine attachments have been developed for this purpose and find wide use. The object of a magazine is to provide a continuous supply of parts for the machine. For economy's sake, magazines must be sufficiently spacious to permit of one operator attending to several machines. Where parts are of such shape that they have to be guided in the magazine, the surfaces must be uniform. It depends to a large extent upon the amount of accuracy required in the finished part whether the expense of uniformity of surface and the guide attachment is justified. Frequently it is more advantageous to have an operator load by hand an inserting tool in the machine turret. In some cases, the machine is stopped at each cycle of operations by means of an automatic stopping device and the work placed directly in the chuck after which the machine is started and the operations carried out automatically.

Two of the outstanding attachments for secondary operations consist of the trough type of magazine for plain pieces, straight studs, short shafts, etc., without shoulders and of a special type for pieces that will not roll in a straight path. In the trough-type magazine, the blanks drop onto a carrier and at the proper time are brought forward



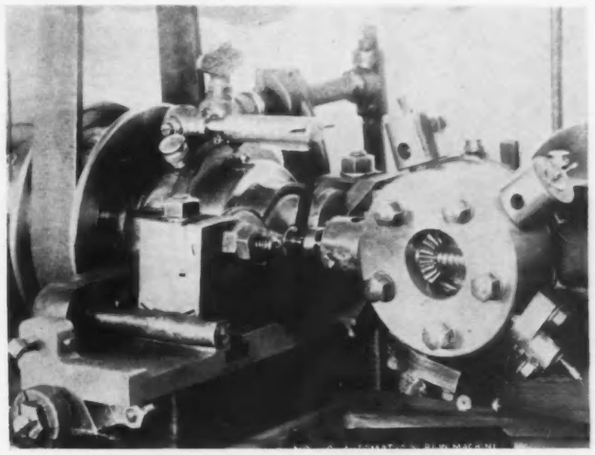
into line with the chuck into which they are pushed by an inserting tool. The chuck closes automatically, ejecting the finished part only after the operation has been completed. A circular disc device serves for pieces that will not roll in a straight path, the magazine being indexed by a ratchet arrangement which operates in conjunction with the cross-slide, so that only one piece at a time can escape through the opening at the bottom. A transferring arm takes the place of the carrier.

Steel, usually bar stock with a relatively high sulphur content, and brass, in the form of extruded rod, are the most important raw materials used in screw machine products. High sulphur steel has a fibrous structure which makes for free cutting properties. Extruded brass rod is also very suitable for screw machine treatment. Aluminum and alloys, such as bronze and nickel-silver, are also used to some extent in the manufacture of screw machine products. In fact, there are no technical obstacles to the shaping of nearly all commercial metals and alloys in the screw machine, but as the chief merit of this process lies in its economy, it is only natural that steel and brass are the dominant materials. In fact, screw machine products specialists declare that automatic machines are at their best when handling bar stock for which they were originally designed.

After the parts come from the machines, they are thoroughly cleansed, the adhering oil being reclaimed by extractors. After having been subjected to a strenuous steam bath, the parts are given a film of protective oil coating with a spray. Then they are again cleaned, sorted and weighed, following which they are inspected. In large plants, specializing in the production of screw machine products for electrical manufacturers, a large staff of expert inspectors is employed to sort parts, all faulty pieces being rejected.

Dimensions are maintained within a limit of 0.002 in. and even closer when there is need. Industry at large is awakening to a full realization of the fact that observance of tolerances has come to be largely a matter of cost. Where a part will perform as efficiently when it is a thousandth part of an inch oversize, it is merely throwing money out of the window to specify tolerances of 0.002 in. This applies just as much whether the elecrical manufacturer operates his own battery of screw machines or whether he has the work done by an outside specialist. The latter must pass the cost of closer than close inspection and of the resulting rejections onto the buyer, just as the self-contained plant must foot this cost in the form of more time expenditure by employees and heavier contributions to the scrap pile.

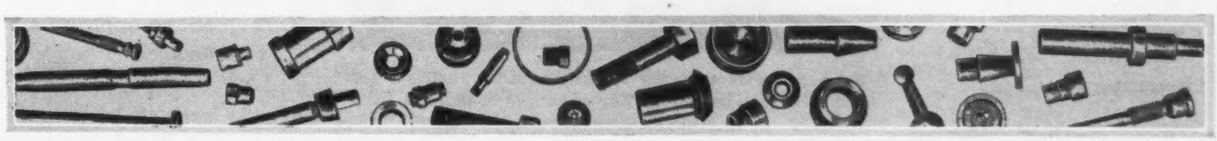
Magazine attachments provide a continuous supply of parts

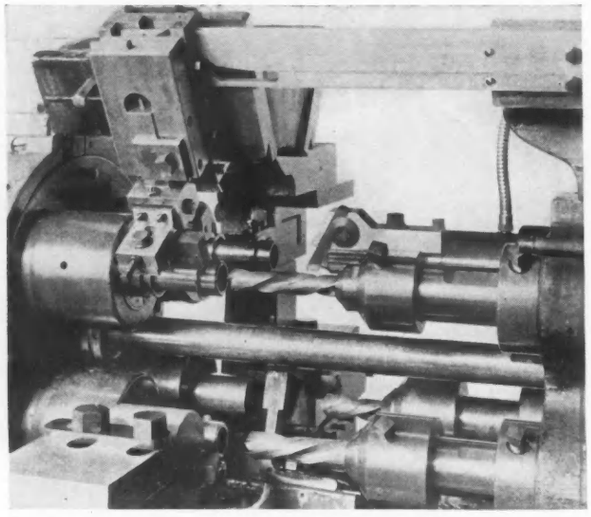


A typical drilling and tapping attachment

Whether it pays an electrical manufacturer to install his own screw machines or whether he is better off, if he gives his work to a jobbing specialist, is a problem depending altogether upon the size of the plant and the quantities of parts used. It may be well to bear in mind that whether two or a battery of twenty-five screw machines is operated, provision must be made for handling the scrap, for cleansing the work and extracting the oil from it. There is a certain overhead expense in these necessary operations that is probably not much heavier for a battery of twenty machines than for one or two. The highly systematized manner in which large plants conserve, prepare, and dispose of their scrap gives them an advantage in revenue from that source and offsets in costs that the manufacturer with only a few machines will find it difficult to match. On the other hand, there are electrical manufacturers whose product is such that they must exercise the closest control over every part that goes into it. For that reason they find even a small installation of screw machines more advantageous than to give their work out. Jobbing screw machine products specialists, as a rule, are not keenly interested in orders for small lots of difficult parts, especially when the buyer is particular and must have deliveries promptly just when the screw machine products specialist has a good run of profitable quantity business. An electrical manufacturer requiring unusual accuracy in his parts and unfailing uniformity in the metal used will probably save himself much worry by having a screw machine department in his own plant and under his direct supervision and control.

While a few screw machine products, such as cap nuts and screws, crown nuts, milled screws and studs, set screws, slotted and thumb nuts are considered standard electrical parts, the major part of the electrical demand is based on specifications, blueprints, sketches, or samples. There are very few electrical products that do not contain a screw machine product in one form or another, such as arms, binding posts, bushings, hubs, studs or terminals. In knife switches, cap nuts, studs and contact nuts are used; in sockets, hubs, binding posts, center studs and terminals are screw machine products. Lighting fixture manufacturers use large quantities of lamp bushings, terminal studs and nuts as well as combination rod bodies. Reference to the heavy use of metal inserts, made on the screw machine, by molded insulation manufacturers and in connection with





The modern automatic screw machine permits the use of a dozen or more tools, each of which performs a specific operation in shaping the product, such as drilling large and small holes, chamfering, shaving, reaming, tapping, knurling, and so on

electrical porcelain has been made previously. Many parts of radio receivers are screw machine products, especially so binding posts and nuts. Domestic appliances of all sorts contain screw machine products in one form or another. So does every dry cell battery and nearly all electrical instruments. The roster of electrical products to which the screw machine contributes embraces nearly all of the industry's divisions, including telegraph and telephone.

Some of the manufacturers of screw machines also operate large plants for the production of screw machine products. Among the screw machine products there are those who specialize in parts of not more than 1 in. in diameter. There are those who go in for large parts, measuring 2½ in. and more in diameter and 10 in. and over in length. Some of the New England brass fabricating plants have efficiently equipped departments for the manufacture of screw machine products. Others combine the making of screw machine products with the manufacture of springs, assembling the two when called upon. Another advantage offered by some of these specialists is that they have electroplating departments in which screw machine parts can be finished in any of a wide range of protective and decorative finishes.

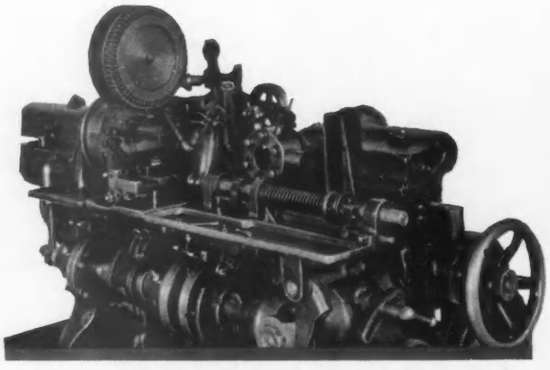
When ordering screw machine products too much pains can not be taken in formulating the instructions and specifications so that they will contain everything that the screw machine specialist may want to know. In addition to the fullest information regarding sizes and dimensions, it is desirable to specify what part of a piece, if any, should have extra finish. Are holes to be reamed? If reamed, what are the plus and minus limits? If there is a hole through a piece from end to end, is it necessary that it be smooth at both ends? Gages for size of thread can not be set forth with too great care. Where parts are called upon to perform out-of-the-ordinary service and metal of special properties is required, the fullest information on what is expected of the part should be furnished. Moreover, in addition to samples or templets or, in the case of new products, blueprints, the part in which a piece is to be assembled, should be sent to the screw machine products specialist, as this will frequently help him to greatly facilitate the assembling.

To obtain the best results from automatic screw machines, whether they are owned and operated by the electrical manufacturer or by a specialist contractor, the parts to be made, unless of the standard kind, must be designed with a view not only to serviceability and economy of cost, but also with proper regard for the peculiarities of screw machine operation. Where an electrical manufacturer gives his work out, he will do well in enlisting the cooperation of the screw machine specialist so that these peculiarities of the machine may be fully taken advantage of in the design of the part.

Screw Machines Make Parts Used in These Typical Electrical Products

Here are twenty-five electrical products among the many that contain screw machine products of some kind such as nuts, screws, bolts, binding posts, arms, bushings, studs, pins, collars, spacers, all of many forms and different types.

Annunciators
Bells and buzzers
Charging outfits
Clothes washers
Cooking utensils
Control apparatus
Dry batteries
Electrical instruments
Exercisers
Fans
Floor surfacing machines
Generators



A circular disc magazine serves for pieces that will not roll in a straight path. The magazine is indexed by a ratchet arrangement

Irons
Lighting fixtures
Motors
Portable tools
Radio apparatus
Refrigerators
Signal apparatus
Sockets
Storage batteries
Switches
Telephone apparatus
Toasters
Unit heaters

What's NEMA Doing?

A department covering activities of the divisions, committees and sections of the National Electrical Manufacturers Association

New Section Heads Elected by Nema

The National Electrical Manufacturers Association announce the election of new chairmen and other officers of the following sections:

Fan Motor—E. L. Barkhouse, Emerson Electric Mfg. Co., Inc., St. Louis, Chairman; L. L. Goding, Wagner Electric Corp., Secretary.

Vulcanized Fibre—J. K. Johnston, National Vulcanized Fibre Co., Wilmington, Secretary.

Industrial Lighting—G. J. Henry, Wheeler Reflector Co., Boston, Chairman; D. E. Worrell, Quadrangle Mfg. Co., Chicago, Secretary.

Air Circuit Breaker—R. A. Neal, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Chairman; A. W. Lundstrom, General Eectric Co., Philadelphia, Secretary.

Small Circuit Breaker Group of the Air Circuit Breaker Section—C. A. Bates, Bryant Electric Co., Bridgeport, Conn., Chairman.

Carbon—H. C. Mills, Morganite Brush Co., Long Island City, N. Y., Secretary.

Industrial Control—F. W. Magin, Square D Co., Industrial Controller Div., Milwaukee, Chairman.

Motor and Generator—Charles F. Norton, Howell Electric Motors Co., Howell, Mich., Chairman; L. J. Osborn, Fairbanks, Morse & Co., Chicago, Vice-Chairman; W. A. Black, Fairbanks, Morse & Co., Chicago, Secretary.

Panelboard and Distribution Board—Arthur J. Pringle 2d, Pringle Electric Mfg. Co., Philadelphia, Chairman; H. E. Ruggles, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Secretary.

Attachment Plug—R. M. Eames, Bryant Electric Co., Bridgeport, Conn., Chairman.

Non-Metallic Conduit—D. H. Murphy, Wiremold Co., Hartford, Conn., Chairman.

Allen Heads Mica Section

The manufactured electrical mica section of Nema recently announced the election of Thomas Allen as chairman and M. A. Chapman as secretary for the coming year.

Mr. Allen is associated with the Macallen Company of Boston, and Mr. Chapman with the Mica Insulator Company of New York City.

Conduit Section Names F. W. Hall

At a recent meeting of the rigid conduit section of the Nema, Frank W. Hall of the General Electric Company was elected chairman for the ensuing year.

The section also elected H. S. Walker of Walker Brothers as secretary and treasurer, and George H. Sicard, assistant secretary and assistant treasurer.

At the same time the technical committee was reappointed as follows: H. A. Calderwood, chairman, H. S. White, and F. W. Nullmeyer.

The following commercial committee was appointed: J. S. Patterson, chairman, J. H. Crawford, George F. Holly and H. S. Walker.

Street Lighting Section Formed in Nema

A street lighting section, composed of six companies manufacturing standards and equipment for street lighting, was organized in the National Electrical Manufacturers Association at a meeting held in the Cleveland Hotel, Cleveland, Ohio, on Nov. 14. F. H. Winkley of the General Electric Company was elected chairman and L. A. S. Wood of the Westinghouse Electric & Manufacturing Company, secretary.

The next meeting of the group is scheduled for the Book-Cadillac Hotel, Detroit, Mich., on Dec. 18, at which time the members will discuss data giving a comparison of competitive types of street lighting equipment, methods of determining costs of standards, and the proper classification and collection of sales statistics. All manufacturers of this type of equipment are invited to attend.

The following manufacturing companies were represented at the organization meeting:

Line Material Company, General Electric Company, Union Metal Manufacturing Company, Westinghouse Electric & Manufacturing Company, Wheeler Reflector Company, and the Electric Railway Equipment Company.

To Promote Electric Heat

DESIGN chosen by the N. E. L. A. and electric furnace section of Nema, for use in advertising, to promote the use of electric heat for all purposes

A. Penn Denton Finds Approval for Nema Standards

A. Penn Denton, engineer, director of the armored conductor and metallic flexible conduit section of Nema, reports after a trip through the South and Middle West, which included stops at Atlanta, Memphis, Louisville, St. Louis and Chicago, that he finds the electrical inspectors and electrical contractors very much in favor of the new armored cable standard adopted recently by Nema and the armored cable industry.

These new standards will have a great effect on the clearing up of the unsatisfactory armored cable situation as it has existed for the last two or three years.

Mr. Denton stated that the electrical inspectors and contractors are very desirous of obtaining a single standard for armored cable as well as one for the fittings that go with it. They also expressed the feeling that the manufacturers of cable and fittings should cooperate more closely with the inspection departments of the various cities to produce a product which is not only economical but one that has a very high factor of durability and safety.

Every place he visited and every meeting he attended, Mr. Denton found the greatest enthusiasm shown in the standardization work being undertaken by the manufacturers associated with the wiring materials division of Nema.

Mr. Denton also found that the inspectors of the various places visited were greatly in favor of a close adherence to the National Electrical Code and for the adoption of a uniform ordinance.

Standards Committee

The Standards Committee approved the following definitions which were submitted by the Switching Equipment Group of the Switchgear Section: Grounding Switch, Rotating Insulator Switch, and Tilting Insulator Switch.

The Power Switchboard Group of the Switchgear Section submitted the following rules, which were approved by the Standards Committee: Voltage Rating, Current Rating, Carrying Capacity of Switching Devices, Temperature Rise, Bus Spacing and Insulation, Grounding Device, Interlocks, Locking, Handling Devices, Small Wiring Connections and Standard Arrangements.

The standards for thickness of paper and lead to be employed for various voltages of power cable drawn up by the Power Cable Group were approved. The submission of these standards to the American Standards Association was also approved.

Facts, Figures and Trends

Statistical information of value to electrical manufacturers in working out policies and plans for production and marketing

Decrease in Employment Smallest on Record

A summary of employment of the United States Bureau of Labor Statistics indicates a decrease of employment in manufacturing industries amounting to but 0.6 per cent in July, which is stated to be the smallest decrease in July for any year since the Bureau began the present series of reports.

The decrease in employment in all the industrial groups surveyed was only 0.2 per cent as compared with June, representing only 10,000 employees out of a total of more than 5,100,000. It is stated, however, that payroll totals decreased by 3.8 per cent.

United States Leads in Use of Radio

At the present time there are approximately 20,000,000 radio sets in the world, of which number 9,775,000 sets, or 48.8 per cent of the total, are located in the United States. Germany and England are tied for second place with 2,500,000 sets apiece; while France is next with 1,250,000 sets; Japan next with 550,000 sets; and Argentina next with 530,000 sets; 2,895,000 sets are accounted for in the rest of the world.

Exports of German Storage Batteries

During the first six months of 1929 German storage battery exports reached a record figure of 3084 tons, having a value of 5,800,000 Reichsmarks, as compared with 2310 tons during the corresponding period of the previous year, and 1907 tons during the first half of 1927.

Imports of storage batteries into Germany have shown a steady downward trend and amounted to only 25 tons during the first half of 1929, as against 31 tons for the same period in 1928 and 32 tons in the first six months of 1927.

Survey of Electrical Appliances in Homes

In a survey recently conducted among 3202 typical American homes in twenty-three communities situated in seventeen cities, it was found that women are somewhat apathetic toward additional electrical outlets and fixtures, and that they are not generally interested in electrical wiring as such. 930 women were interested in more adequate wiring, and of the total of 4400 outlets which they desired, more than 59 per cent of them were convenience outlets; 18 per cent one-way switches, and 15 per cent wall brackets.

Of the homes surveyed, according to the Society for Electrical Development, 88 per cent were found to have electric irons, 87 per cent cleaners, 70 per cent toasters, 46 per cent washing machines and 32 per cent percolators. Electric irons accounted for 22 per cent of all the energy used by all the appliances, while refrigerators with only 3.9 per cent distribution accounted for 30 per cent of the energy, and vacuum cleaners numbering 20 per cent of the total appliances accounted for 5.6 per cent of the energy. Electric ranges having a distribution of only 1.9 per cent accounted for 23.3 per cent of all energy used.

Of the 1449 women who expressed a desire for more appliances, 37 per cent wanted electric refrigerators; 22 per cent electric ranges; 20 per cent washing machines; and 20 per cent ironing machines. In 58 per cent of the cases the women reported that they had not bought these appliances because the cost of the appliance and installation was beyond their means, while 16 per cent stated that the cost of operating these appliances was too great.

Use of Electricity in the Home

In 1918 the average household in this country used 272 kw-hr. of electrical energy per year, but this has steadily increased. In 1920 the figure was 349 kw-hr.; in 1922, 359; in 1924, 378; in 1926, 404; and in 1928, 459, an increase of nearly 70 per cent for the ten-year period. At the same time, the average price of residential electric service has declined from 8.3 cents per kilowatt hour in 1918 to 6.55 cents in 1928.

Electrical Devices in Farm Homes

Domestic electrical appliances are used more in farm homes than in city dwellings, according to information received by the electrical division of the Department of Commerce and made public recently.

The data, as revealed in a survey made by the National Electric Light Association, show that more than two-thirds of electrified rural homes are supplied with electric washing machines and 42 per cent with vacuum cleaners. Electric refrigerators are in use in 5 per cent of electrified farm homes, which is the same percentage as in urban dwellings, and electric ranges in 10 per cent of rural homes, against 7 per cent in city dwellings.

Of 529 farm homes reporting the use of electricity, 37 per cent used curling irons, 35 per cent toasters and 5 per cent to 14 per cent fans, percolators, grills and heaters.

Of 1189 farm homes having radio receiving sets, 94, or 8 per cent, were operated from electric light sockets.

Average Labor Turnover Rate

Up to July 1, when the Bureau of Labor Statistics took over from the Metropolitan Life Insurance Company the task of collecting and publishing labor-turnover rates, each month in 1929 showed a higher net turnover than the corresponding month of 1928.

The Bureau of Labor Statistics reports that in July, 1929, compared with July, 1928, the quit rate is higher than last year, as is the total separation rate and the accession rate. Both the lay-off rate and the discharge rate, however, are lower than a year ago, which is interpreted as indicating that factories are running more steadily and that business is more stable than in the corresponding month last year.

Public Utility Earnings Increase

An increase of 17.5 per cent in gross earnings of public utility enterprises, exclusive of telephone and telegraph companies, is reported for the first eight months of 1929 as compared with the corresponding period of 1928.

Earnings for the first eight months of the present year as reported by 95 companies operating gas, electric, heat, power, traction and water services were $651,500,000, as compared with $554,432,512 for January to August, 1928, inclusive.

America Leads World in Use of Telephones

On Jan. 1, 1928, there were 30,990,304 telephones in the world, of which number the United States accounted for 18,522,767, or approximately 60 per cent. In all of Europe there were only 8,623,407.

In this country there are 12.2 telephones to each 100 inhabitants in communities of under 50,000, while in large cities there are 26.7 per 100, and for the country as a whole 15.8. In New York City alone, for example, there are more telephones than in all of Great Britain and one-half of all of Germany, and Chicago has more telephones than in all of France.

Building Expenditures in 302 Cities

Total expenditures for new buildings in 302 cities in the United States with a population of 25,000 and over totaled $3,089,075,192 in 1928, a decrease of 4.7 per cent as compared to the 1927 figure of $3,240,441,134. In these cities, $1,908,321,876 was expended for residential buildings in 1928, as compared to $1,961,899,529 the year before, a decrease of 2.7 per cent. Non-residential buildings decreased 7.6 per cent, the 1927 figure being $1,278,541,605, and the 1928 figure $1,180,753,316.

Germany Prefers These Appliances

(*Continued from page* 36)

considers their evident superiority over most German models, which are said to deteriorate and lose their effectiveness through use. American vacuum cleaners are, however, usually over twice as expensive as the average German vacuum cleaner. They have, nevertheless, found a ready market among the well-to-do classes who can afford to purchase a high-priced model.

It is estimated that not more than one ironing machine is used for every 50 washing machines in Germany. There are very few ironing machines for household use manufactured in Germany, while estimates place the number of ironing machines used in Germany at about one for every 5000 families.

Washing machines are still considered by the German housewife as a novelty. Until recently small headway was made in the development of their use, and it is estimated that there is not more than one electric washing machine for every 700 families. Domestic labor is very cheap in Germany and expert laundresses may be hired at about 0.50 mark ($0.12) an hour. Washing in the average German family is done only once a month at the most, but intervals of six to eight weeks are not rare.

German manufacturers of electric household appliances have up to now paid little attention to the production of efficient electric washing machines, and there are, therefore, relatively few modern German models on the market. Several German washing machines which are run by direct gear drive are equipped for boiling with coal or gas as fuel.

The electric iron is probably the most extensively used electric household appliance in Germany, it being estimated that at least one family out of three has one. German electric irons are similar in design and execution to those manufactured in the United States. The average German iron has a heavily nickel-plated body with a polished sole. So-called American grips have made their appearance in Germany and are increasing in popularity. Several models are equipped with a regulator, which prevents the overheating of the iron.

Up to two years ago, electric household refrigerators were little used in Germany. Several American firms have, however, entered this field and sold quite a number of refrigerating machines for household and hotel use. The German industry, which up to that time produced only large refrigerators for packing plants and stores, began seriously to investigate the sales possibilities, and in a short while several German electric household refrigerators appeared on the market.

The market for such refrigerators is still relatively small, mainly because ice is comparatively cheap in Germany, while electric refrigerators are expensive as compared to ordinary ice boxes. The mildness of the climate in Germany constitutes another reason why refrigerators are not used so much there. The average German housewife buys perishable goods only in such quantities as will be sufficient for one day. Estimates place the number of ordinary ice boxes at not more than one for every 12 families, while that of electric refrigerators at not more than one for every 500 families.

Most German refrigerators are similar in design to those sold in the United States. The cabinets are finished usually in white enamel, while the inner wall has a vitreous porcelain surface. The insulation usually consists of extra-thick cork, while the hardware trimmings are of brass or nickel-plated. German refrigerators are said to be not as noiseless in operation as most American models.

Floor polishers, operated by electricity, have only recently made their appearance in Germany, and it is not believed that there is more than one electric floor-polishing machine for every 1000 families. All German polishers of this kind have polishing and floor-drawing equipment. Two American polishers of this nature are sold in Berlin and it is understood that sales have been satisfactory.

Heating pads are extensively used in Germany; it is estimated that there is one heating pad for every 45 to 50 families. There are numerous German heating pads on the market, but, so far as it has been possible to ascertain, no foreign heating pads are sold here.

The average modern German heating pad is equipped, inside of the pad, with an automatic regulator; that is, the contacts do not work in atmospheric air but in an evacuated thick glass cylinder. Most of the modern German heating pads are, in addition, equipped with a melting fuse, composed of a separate heating coil, which automatically interrupts the current as soon as the temperature of the heating pad rises to a dangerous point. The covers of German heating pads are usually made of nonshrinkable, washable linen.

Electric ranges are made use of in Germany only to a very small extent. Cooking by electricity is more expensive than cooking by gas, while electric stoves cost two or three times as much as gas stoves.

In certain sections of Germany, however, the difference in operating costs between an electric stove and a gas stove is not very large. It is estimated roughly that an electric stove consumes 1 kw-hr. of electric current for every one-half cubic meter of gas that a gas stove consumes. In sections where power current is available at cheap rates, the cost of cooking by either process is more or less equal. If the power current costs 0.10 mark ($0.024) per kw-hr. and gas costs 0.16 mark ($.038) per cubic meter, the unit cost of cooking by gas would be 0.08 mark ($0.019).

Dealers in those sections of Germany where charges for gas and electricity are in approximately the same ratio as those quoted above have been stressing the advantages of the electric stove over the gas stove, and sales have been fairly satisfactory.

Electric cooking sets, of the so-called economical type, have made their appearance in Germany. They are used for cooking, baking, and roasting, as well as for sterilizing and storing hot water. The most popular is the Elektro-Ekonom, priced at 95 marks ($22.63). This price includes an electric plate and insulated container, three aluminum pots, and two aluminum covers. A roasting pot costs 4.30 marks ($1.02) additional; a sterilizing pot, 9.10 marks ($2.18); a cake form, 2.10 marks ($0.50); and a pudding form, 4.75 marks ($1.12). These pots have a diameter of 160 mm. and have a capacity sufficient to provide meals for two persons. Sets for 3 to 5 persons cost 108 marks ($25.78); for 6 to 9 persons, 125 marks ($29.77); and for 10 to 16 persons, 148 marks ($35.25).

Notwithstanding their relatively low price, toasters are not used as much in Germany as in the United States. Germans are small consumers of toasted bread, but this is partly due to the fact that no bread identical to that used for toast in the United States is baked here. As a rule, however, Germans prefer rolls to toast for breakfast.

There are several models of German toasters on sale in Berlin, similar in design to those used in the United States. The large majority of them are of the simple type, there being only a few models of the inverted type where the

bread must be turned over by hand. No automatic toasters, of the kind which snap off the electric current when the bread is toasted sufficiently, are manufactured in Germany.

The electric heating plate has not met with much favor in Germany because of its relatively high consumption of current. German heating plates are round shaped, and practically all of them are nickel plated, supported by three or four legs. Handles are almost always provided. Some German heating plates are rectangular in shape, either black enameled with a top of aluminum tin or nickel plated with a matted top.

Water-heating pots are perhaps the most widely used electric appiances of this category, and it is estimated that one family out of 15 has one. They are used principally for incidental heating of water in homes.

Water Heating Devices That Are in Favor

German water-heating pots are nickel-plated and highly polished. The handles are detachable, while a connecting cord, with plug, is always provided.

Electric kettles are not as much in demand in Germany as electric pots, since the latter are considered much more convenient. German electric kettles are similar in shape to most American products of this type. They are provided with a long necklike arrangement for pouring out the water, a cover, and a handle. Most of the following German models are nickel-plated:

It is estimated that one family out of 120 in Germany owns an electric coffee percolator. Germany coffee percolators, similarly constructed to those used in the United States, are nickel-plated and highly polished.

A new model, called the Expresso, has recently appeared on the German market. A pipe projecting from the top terminates in three to six smaller pipes, enabling several cups to be filled simultaneously. The price ranges from 33 marks ($7.86) to 47 marks ($11.19).

Electric teapots are much less used in Germany than electric coffee percolators, because Germans as a rule drink much more coffee than tea. German electric teapots are similar in design to those used in the United States and are nickel-plated and highly polished.

Electric heaters for incidental heating are used to a fairly large extent in Germany, but sales have been retarded because of the high amount of current consumed by such heaters. There are several types of German electric heaters on the market in Berlin, but up to now the most popular type seems to be the so-called reflector (headlight) heater, which radiates heat in a certain direction. Radiator heaters of the portable type are also in demand, as well as wall-insert heaters, and electric stoves similar to the kerosene stove in appearance.

Electric hot-water tanks are increasing in popularity in Germany. They are not much more expensive to operate than similar gas-heated tanks, and are used in houses which are not provided with a regular supply of hot water.

German electric hot-water tanks are in cylinder form and are designed to be hung on the wall, either in the kitchen or at the head of the bathtub.

Hair dryers are used extensively in Germany. German electric hair dryers, equipped usually for hot and cold air, are similar in appearance to those made use of in the United States. Most of them are nickel-plated and highly polished, and have a black-enameled handle. It is estimated that one family out of 25 has an electric hair dryer.

Electric massage vibrators are very popular in Germany and it is understood that annual sales are fairly large. Most German vibrators are capable of deep-penetrating vibration, and the majority of them give both percussion and rubbing strokes. Practically all German vibrators are equipped with speed regulators, and are similar in design to vibrators manufactured in the United States.

Fans are not used as much in Germany as in the United States. The temperature and humidity are never so high, for example, as in the southern part of the United States, and the demand for fans is consequently much smaller. Germans also do not place the same emphasis upon the circulation of fresh air in homes and public gathering places as Americans; many persons sleep with the windows closed. The use of fans in German homes seems to be confined entirely to kitchens, where they are installed in the wall and serve as ventilators.

Most German fans have brass blades and trimmings, but many models are nickel-plated. Non-oscillating fans form the large majority of table fans used; oscillating fans, it is estimated, form only about 15 per cent of table fans sold. Ceiling fans are never used in private homes.

It is understood that American fans have made their appearance in certain parts of Germany, especially around Bremen and Hamburg.

Germans are quick to adopt anything that has been brought out and used with considerable success in America. They have therefore shown a great interest in electric hand dryers, which eliminate the use of towels. The Protos model is of the pedestal type, finished in white enamel. Foot-control pedals make it unnecessary to touch the apparatus with wet hands. The machine consumes 1200 watts and sells for 270 marks ($64.31).

There are several models of German kitchen utility motors on sale. Such motors may be attached to all kinds of kitchen utensils, such as meat grinders, coffee mills, fruit presses.

Motors especially designed for attachment to sewing machines have made their appearance on the Berlin market since the beginning of 1927, and, although their utility is recognized by the German housewife, sales have not been large. The price is considered high and it is doubtful if the use of such motors will increase in the near future if prices do not come down considerably.

As far as it has been possible to ascertain, there are only four German models of sewing-machine motors of 1/16 hp. on sale in Berlin.

A curling-iron heater, selling under the trade-mark Protos, has met with some success in Germany. It is made of glazed porcelain, shaped like a tube, with an opening in the center into which the curling iron is inserted. It weighs 0.6 kilo, consumes 165 watts, has a 30-mm. opening, and sells for 12 marks ($2.86).

There are numerous German incense burners of all kinds of designs on the market in Berlin. The prices range from 7.50 marks to 45 marks ($1.79 to $10.72).

Some German manufacturers have produced fancy cigar lighters for home use which have met with favor in Germany. The basic principle of such lighters is similar to that used in automobile cigar lighters. Prices range between 6 and 30 marks ($1.43 and $4.76).

There are numerous models of immersion heaters in Germany. They are used for quickly heating a glass of water and are shaped like a pencil, although the A. E. G. model is in form of a spiral.

Favorable to American Products

The general economic situation in Germany is thought to be favorable for the further introduction of American products into this market. With the continued economic expansion, the purchasing power of the public has shown a tendency to increase during the last few years, and this should affect favorably the sales of electric household equipment. Although it is understood that prices of certain raw materials used in the German electric industry have advanced, retail prices of electric household appliances have slightly decreased, not only because of the severe competition among German manufacturers but also because of the increased outputs of the industry and the savings resulting from the installation of more efficient machinery.

The majority of American firms doing business in Germany have granted exclusive agencies to firms located in either Berlin or Hamburg, with permission to establish

regional subagencies in other parts of Germany.

It does not appear advisable, however, in the case of electric household equipment, to grant an exclusive agency to one German firm, since this form of sales organization has not proven efficient and most agents have not proven themselves capable of handling all of Germany, which is slightly larger than the combined area of the States of New York, Pennsylvania, Ohio, and Indiana. Many firms have, therefore, found it more practical to grant agencies to German firms located in Berlin, Hamburg, Munich, Frankfort-on-the-Main, Leipzig, Stuttgart, Cologne, etc., but carefully defining the territory to be covered by each regional agent. Until relations between the American firm and its German agents have continued long enough for the American firm to become well acquainted with the agents' local standing and sales methods it is advised not to make large consignments.

C.i.f. quotations are preferred by German dealers; f.o.b. quotations are given little consideration, since it is difficult for the German firm to ascertain American inland freight rates.

Liberal Credits Are the Rule

Although economic conditions have improved in Germany, interest rates are high (8 to 10 per cent) and the average firm finds it, therefore, difficult to pay cash. Credits of from 30 to 90 days are customary. Many dealers feel that if liberal credits are not extended, a discount should be allowed for cash against documents, if they are to be the permanent agents of the American manufacturers.

In many lines the German market is of a severely competitive nature; this is especially true of the electric household-appliance industry. Many American firms, especially those dealing in vacuum cleaners and refrigerators, have therefore found it more advantageous to organize efficient sales organizations in the form of local companies, established in Berlin or one of the ports of entry (Hamburg or Bremen). These companies are called "G. m. b. H." (limited liability) companies. Some, on the other hand, have formed an "A. G." company, the equivalent of the American corporation. If the sales organization is not to be very large, the G. m. b. H., because of its simpler structure, is perhaps the more convenient form than the A. G. company. The minimum requirement for a G. m. b. H. company is a capital of 20,000 marks ($4,764) and two founders, while an A. G. company requires a minimum capital of 50,000 marks ($11,910) and at least five founders. In both cases permission to establish either form of company must be obtained from Government authorities, while registration in the commercial register (Handelsregister) is necessary.

Salesmen are paid either a straight salary, salary and commission, or a commission only, the two latter systems being most often used in the sale of electric appliances.

All large German manufacturers and dealers in electric household appliances have well-developed sales organizations and maintain demonstrators in the larger department stores. Efficient service departments are recognized as essential by all dealers and manufacturers. House-to-house canvassing is seldom practiced.

An American firm does not, in general, incur liability to taxes in Germany if it sells through agents, provided it has no permanent relationship with them. It pays taxes only if it maintains a branch or independent selling organization in Germany, and it is then subject to direct federal taxes.

The income tax is known as the "Einkommensteuer" and is assessed only against natural persons. If an American resides in Germany for five months in order to represent an American firm in Germany, receiving therefor a regular salary, only his salary in Germany is taxable. If, however, he stays here more than six months, all of his income, including that from his American securities, is taxable.

An American employer of clerks, salesmen, etc., must also collect their income tax, usually by deducting it from their salaries.

Corporation tax is known as the "Koerperschaftssteuer" and is assessed on the net income of the firm. It amounts to 20 per cent. If the capital of a G. m. b. H. company does not exceed 50,000 marks ($11,910), reduced rates are granted.

Property tax is known as the "Vermoegenssteuer." The general rate is 5 per 1,000. The rates decrease, however, on amounts less than 50,000 marks ($11,910) and increase on amounts over 250,000 marks ($59,550).

The most important indirect federal tax which would be levied on American firms themselves doing business in Germany is the following:

Turnover tax is known as the "Umsatzsteuer" and is assessed on the total sales made by the firm. It is not imposed on imports or exports, but only on the turnover within Germany itself. The rate amounts to 0.75 per cent of the sale price.

Other federal (indirect) taxes which might be levied on American firms doing business in Germany are the exchange tax (Wechselsteuer) of 0.1 per cent on accepted bills of exchange or checks, and the land-purchase tax (Grunderwerbssteuer) of 3 per cent of value of property.

The German law protects the person who first registers a trade-mark, regardless of whether or not he was the first person to make use of it. American manufacturers of electric household appliances who desire to market in Germany should apply for trade-mark registration as soon as possible. It might otherwise happen that their competitors will register the trade-mark in their own name or that it will be registered by an agent of the American firm with whom the latter has severed connections. Trade-mark registration must be renewed every 10 years.

Patents on new inventions that may have a commercial use are granted to the first applicant. The inventor or any person acting with his consent may make application. The priority is determined by the exact date of the application. An applicant for a German patent on an invention already patented in the United States will, however, have the advantage of priority dating from the date of the first application for the American patent, provided the German patent is applied for within 12 months thereafter. A German patent is valid for 18 years.

The usual method of payment for retail sales of electric household apparatus is cash on delivery, but many retailers grant limited credit to their purchasers.

The system of installment payments for vacuum cleaners, washing machines, and other expensive equipment is now in general use throughout Germany. Payments are generally arranged on a basis of 12 months, although a longer period is often acceptable to the dealer.

Repossessions Are Low

Several Berlin dealers have stated that repossessions average about 1 to 2 per cent of the installment sales, which would indicate that the installment selling of such products is on a sound basis in Germany. The smallest percentage or repossessions is said to occur in vacuum cleaners.

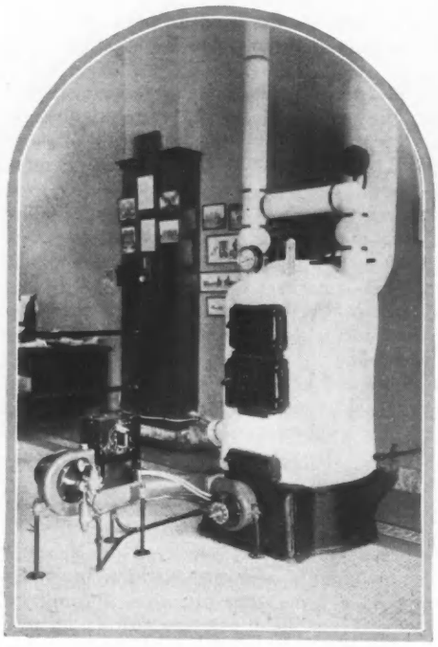
Advertising of electric household appliances by mail is not resorted to as much as in the United States, and the main stress seems to be laid on newspaper advertising, one to two advertisements being published each week. Such advertising has improved considerably within the last few years, and carries specific messages that are predetermined as being of the greatest interest to the reader.

Advertising through billboards and kiosks is also carried on extensively by some dealers in electric household equipment, and these mediums rank close to newspapers.

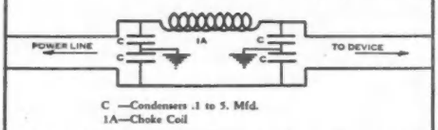
Although many firms in Germany are equipped for English correspondence, German is generally essential for a satisfactory development of sales of imported products.

Silencing Interference

Man-made Can Be



For Oil Burners that use constant operating Igniter Plugs.



C —Condensers .1 to 5. Mfd.
1A—Choke Coil

NOTE:—*Motor Frame and Furnace Casting should be properly grounded.*

IF YOU built a noisy electric refrigerator you would take immediate steps to redesign it. You would have to, to preserve your good will. The noise would be evident and objectionable to everyone with a pair of ears, and his ears are always with him.

But take that same refrigerator and silence it. Then the manufacturer is likely to settle back with relief. Not being able to hear it even at a short distance, he feels secure. The trouble is that, unlike his ears, his radio set is not always with him. So he does not appreciate that there may be existent in this quiet, smooth-running unit a miniature radio transmitting set which is likely to raise Cain and no end of future trouble for him, due to the disturbance it sets up in neighboring radio sets.

That's the trouble with the nuisance-making interference of many electrical products—unaided by radio, it can be neither seen nor heard and yet it may be making sure inroads into the good will which should be an accompaniment to every product marketed. That's where the sinister part of it comes in.

Radio, at present, has such a hold on the public that the day is not far distant when a customer in purchasing an appliance will make it a condition of the sale that that appliance will not interfere either with his own radio reception or that of his neighbor.

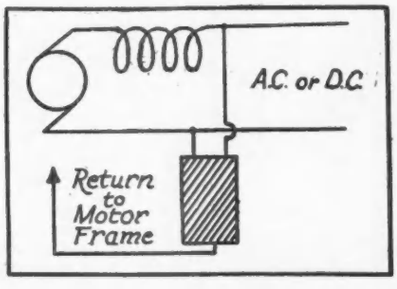
Therefore, the wise electrical manufacturer today is adding "man-made static" to his list of faults to look for, test out and provide against, even in the design stage of his product.

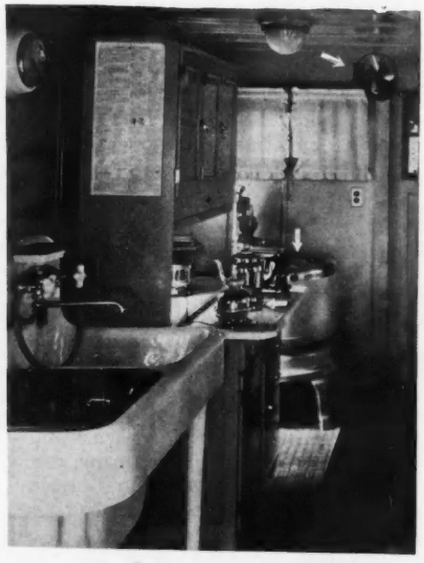
There is nothing hopeless about it. The situation simply calls for an intelligent facing of the facts. And there is plenty of urge upon the manufacturer, for the public has found out that electrical disturbances emanating from equipment of various sorts can be stopped in most cases and greatly reduced in the rest. Furthermore, this same public is coming to demand that protection against this trouble be built in by the manufacturer of the appliance or machine.

Just as no single medicine is effective against all ailments, there is no one piece of protective equipment which may be used on all types of electrical appliances and machinery, even though filter condensers and choke coils are at the basis of them all.

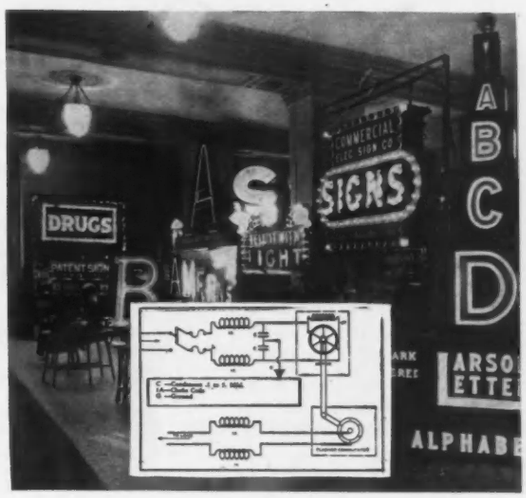
There are, of course, certain requirements common to each of

THE radio disturbance set up by some oil burners may be obliterated by interference eliminators, which work on the theory shown in the drawing above. There are available filters for use even on vacuum cleaners and many household appliances





to Preserve Your Good Will



Man-killed "Static"

them. For instance, the condensers employed should exceed in working voltage, twice the voltage of the lines across which the condenser is used, and the inductance or choke coil employed should be wound of the proper size wire with respect to the current to be carried in accordance with the Underwriters' allowances.

But the job of fortifying against man-made static is one for specialists in that work. Nor are such specialists lacking. They are available with a variety of protective equipment designed specifically for this or that class of electrical product.

The trouble is that often either they are not consulted at all or not until the product to be protected is completely designed. At that late date in the sequence of events it is often more difficult, and hence, more costly, to introduce the protection than as though it were considered as one of the initial requirements in making the original design.

While some types of interference may be eliminated by the use of proper devices at the radio set itself, they can more surely be cured at the source of the difficulty. Take, for instance, universal and direct current motors where some sparking practically always occurs. Waves thus generated often cannot be eliminated without the normal radio reception as well. So it is necessary to go back to the source of the disturbance which is rapidly coming to be considered a function of the manufacturer of the nuisance-making device.

It is surprising the number of electrical appliances and machinery which, unless suitably guarded, may cause serious radio disturbances. Many of these are mentioned in the accompanying list. Generally the cure is not difficult.

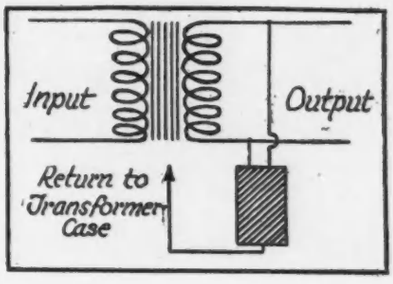
Take the physician's violet-ray machine for instance. That may be tamed if a quarter micro farad condenser is connected across the spark gap. Elevator controls and motors on oil burners and electric refrigerators, which often are suffered in silent martyrdom, have proved to be easily gagged and the noises stopped at once.

In all such cases, the remedy is to connect a by-pass condenser across the contacts of the offending motors. These condensers are fairly small in the case of devices requiring low current. They run to several micro-farads in the case of elevator controls. But they are silencers that function instantly and unfailingly, when properly designed and applied, since they have the effect of absorbing the waste electricity generated by the motor. Thus it is not discharged into the surrounding ether and so cannot reach radio receivers.

A few schematic drawings of filter systems for various applications accompany this article. Others appear in a manual issued by the Radio Manufacturers Association, Inc. Copies may be obtained from the headquarters of that organization at 32 West Randolph Street, Chicago. The price is twenty-five cents.

In this connection it may be well to explain that this manual is not a revision of a similar work issued in 1927 but a complete new publication describing practically every type of radio interference and how it can be eliminated.

FLASHING signs may well be causes of radio interference unless properly protected. Above is a typical circuit for eliminating this type of annoyance. How filters are connected to motors and transformers is shown at the bottom of these pages



No Operator on Board

By R. F. EMERSON
Industrial Engineering Department,
General Electric Company

DOWN GO the costs of handling materials on cars of a plant's yard trackage wherever you can reduce the number of operators per ton carried. Here are described electric cars controlled by a single operator as your boy runs toy trains from a central location

NOW have come motorized larry cars which do not carry operators, but which are controlled from some central location by a single operator. Such a car has two motors (as pictured immediately below), one geared to each of the two axles through a counter-shaft so as to give the required speed reduction.

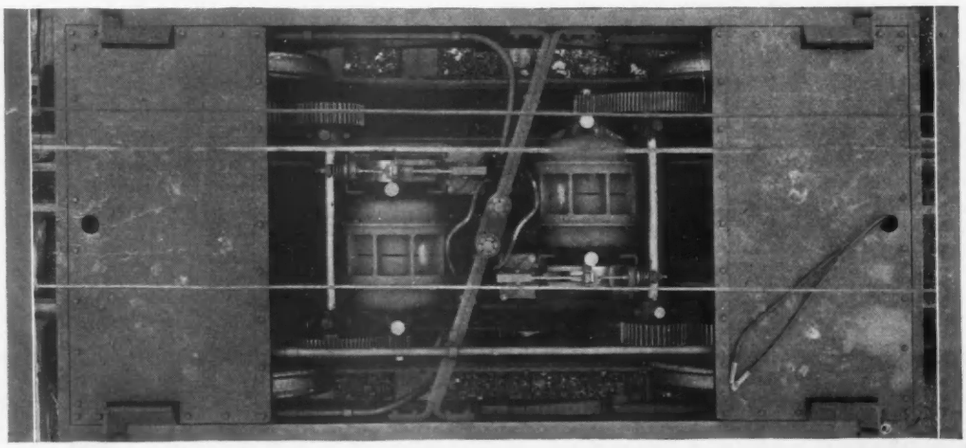
Each motor has a solenoid brake mounted on the shaft opposite from the pinion end. These motors are designed for full-voltage starting, which means that the starting equipment is of the simplest type possible.

Either one or several of these cars can be used on the same track and all are controlled by one operator who moves the control switch in the proper direction, causing the line contactor to close and to energize certain sections of track. As soon as a track section is energized, the solenoid brake coil releases and the motor starts on full voltage. The brake stays released and the motor continues to run until the operator either brings his control switch to the "off" position or until the car runs into a "dead" section of track.

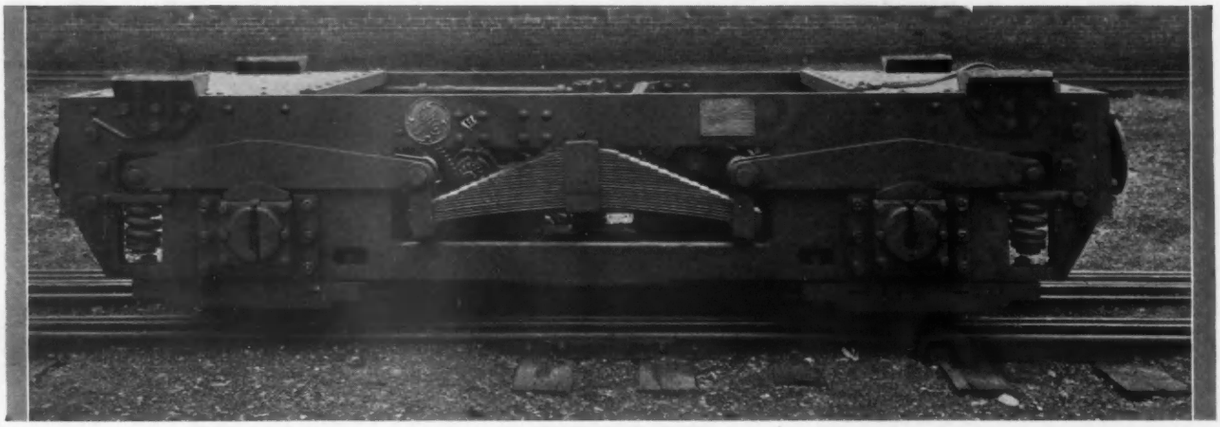
When this happens, power is cut off simultaneously from the brake and the motor, causing the brake to set and to bring the car to rest.

By operating in this way production will be speeded up, not only owing to the use of these cars over less efficient methods, but because the operator experiences no muscular fatigue. From his operating station he can operate several cars merely by manipulating small control switches and there is less chance of slowing up production after a few hours of operating. The use of alternating current is usually cheaper because distribution current is almost invariably alternating and transformers are inexpensive.

Owing to the well-known strength of the squirrel-cage motor which has no commutator and slip rings and the simple method of starting the motors by throwing them on full voltage, the upkeep is reduced to an absolute minimum.

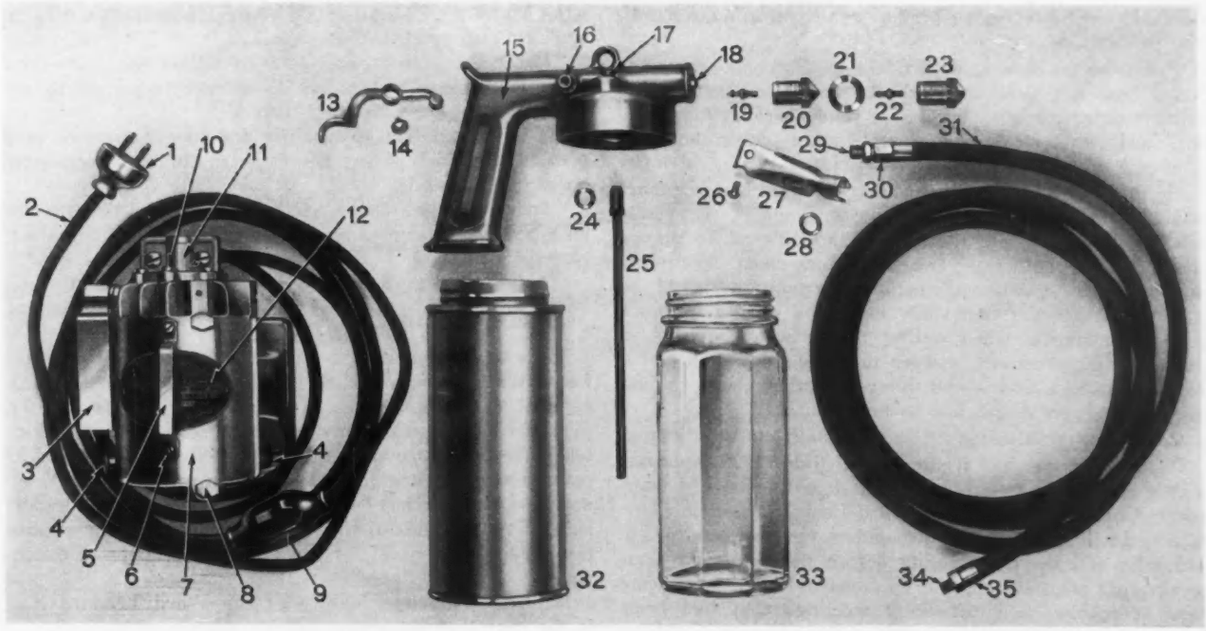


A NEW method for the handling of industrial materials is coming into use with the development of such larry cars as those shown herewith. These are powered by two squirrel cage motors designed for full-voltage starting, and the control is from a central station by one operator who can handle several cars



Paint Spray Components

In addition to an electric motor, which operates to drive a small compressor, manufacturers of paint sprays use many different kinds of materials



ELECTRICAL MANUFACTURING *acknowledges the assistance of the Foredom Electric Company, 15 Park Row, New York, representatives of the Electric Sprayit Company, Inc., South Bend, Ind., in the preparation of the illustration shown above and the following table of paint spray components. This is typical of many of the different types of spray painting devices being manufactured today and will serve to show the various types and kinds of materials employed in the making of these devices*

Notice in the accompanying table that several different kinds of materials enter into the construction of paint sprays. These include several screw machine products, castings, glass, insulation, brass, copper and steel.

Table of Parts and Raw Materials Used in Paint Spray Construction

Part No.	Description	Material
1	Attachment plug	Insulation and brass
2	Attachment cord	Rubber, copper and insulation
3	Muffler	Sheet metal
4	Brush holder	Rubber and brass
5	Handle	Steel
6	Handle screw	Steel
7	Motor	Iron, insulation and copper
8	Oil cup	Brass
9	Switch	Rubber, brass and insulation
10	Screw	Brass
11	Compressor	Steel and brass
12	Name plate	Brass
13	Trigger	Aluminum
14	Screw	Brass
15	Handle	Aluminum
16	Pivot	Brass
17	Valve	Brass
18	Nozzle	Brass
19	Nozzle tip	Brass
20	Nozzle	Brass
21	Washer	Brass
22	Nozzle tip	Brass
23	Nozzle	Brass
24	Collar	Brass
25	Tube	Brass
26	Screw	Brass
27	Guard	Brass
28	Washer	Brass
29	Connector	Brass
30	Nut	Brass
31	Hose	Rubber
32	Container	Tin
33	Container	Glass
34	Connector	Brass
35	Nut	Brass

Shunting Resistance in the Human Circuit

A plan devised in an electrical manufacturer's plant that was successful in eliminating misunderstandings among the various department heads

(*Continued from page* 23)

be made, but it is up to the production organization to handle the production."

From the purchasing department the foreman wanted to know how this department checks up to see that it gets what it orders; how a prospective vendor's reliability is determined; what factors determine when a source should be changed.

Of the time-study department they inquired whether time-study could be made of all the operations in the plant; whether it was part of the time-study man's job to change methods of production; whether stock-room operations could be timed; whether inspection operations could be timed; whether the time-study man took quality of work into consideration when setting times; what happens in case of a disagreement between the time-study man and a foreman as to a time:—and thirty-five other questions just as sharply directed and just as important.

Costs, too, came in for active and intelligent questioning.

It so happened that at the end of July, 1929, approximately half of the ten scheduled departments had been covered by these meetings at Ward Leonard Electric Company. At this time group discussions were suspended for a month, and the last meeting before the recess gave an opportunity to draw out the opinions of the group members as to the value of these meetings that had been held.

Check-up of the attendance showed that the average for all meetings (including those that preceded the question-and-answer meetings) was 94 per cent. Taking excused absences into consideration, it was 98 per cent.

"I got a new insight into what other departments are up against," one foreman reported.

"I used to rave whenever a rush order came up, but since I heard Mr. Burns explain why they were necessary I have felt differently about it," said another.

"We've become better acquainted with each other. Now we know who some of the people in other departments are," remarked a third.

(All three of these quotations are from the official record of this meeting.)

"There is less friction between departments. Now we know each other better and we cooperate more," a fourth man summed up.

Obvious gains not touched upon by the men themselves are several. Certainly every man who attended the meetings must have gained from these an increased confidence in the company for which he was working, and an increased incentive to make his own department fit more smoothly into the general scheme.

A point not to be ignored is the gain to every executive who had a hand in the meetings. Not merely the gain through the clearing up of misunderstandings, and the ability of staff men to count on increased cooperation from the factory's supervisory forces.

But a more personal gain!

"A 'question bee' like this gives the one who must answer questions a better view of his own job, especially in its relations to other departments," Donald McGrow, Ward Leonard's time-study chief, has written.

"The concentrated experience of telling the story four times in one day is excellent experience in presenting the facts of a case to fellow executives.

"It is an excellent opportunity for an executive or staff man to sell himself and his work to the men whose cooperation he needs.

"And it puts the man's relationship with all departments on a new basis, smoothing the paths for future mutual accomplishments.

"If any of our men got more out of the answers to their questions than I got out of answering them, they learned a lot!"

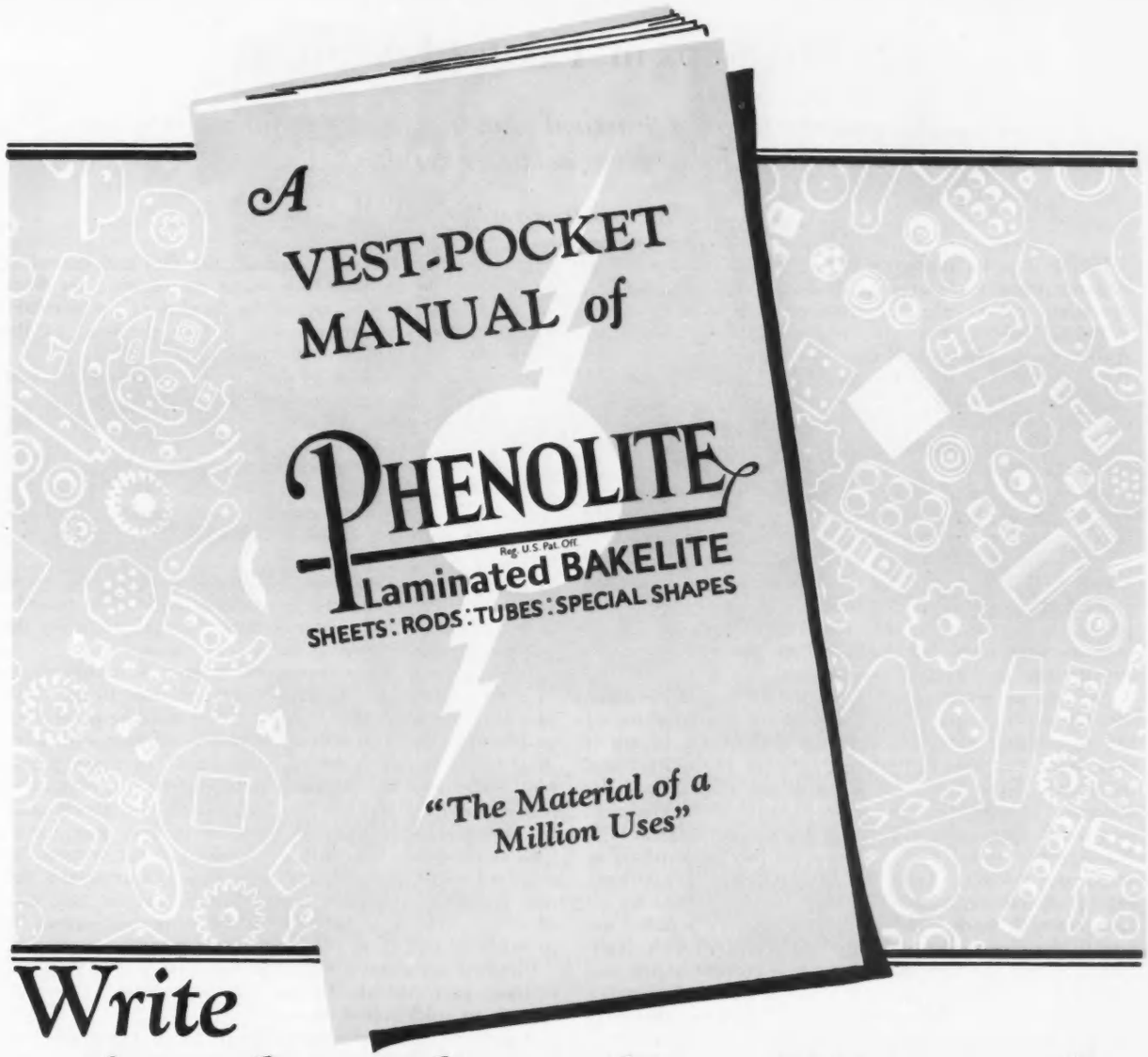
My own opinion is that this series of meetings at Ward Leonard's plant is one of the most important company-educational experiments that has been made in this country. Western Electric Company has night-school classes which teach the departmental organization of the company and its manufacturing plants. And Commonwealth Edison Company, in Chicago, has done pioneer work, under the leadership of A. B. Gates of that company, in systematic exposition of company problems and policies to classes of executives.

But the distinctive feature of the Ward Leonard plan is the fact that the entire subject matter of the talks by executives was determined by the listeners rather than by the speaker or the program director. What this means in the interest with which the answers were received is obvious. Equally plain is the fact that the speakers were enabled to make their talks *vital*, because the questions guided them to direct their remarks to existing needs for information instead of building up, as an instructor usually does, a theoretically correct but possible dry outline.

The developing effect of systematic questioning upon the foremen themselves is plain from a study of the "minutes." Questions asked at first were few, inclined to be general, and more than occasionally tinged with hostility. Questions asked at later meetings covered more ground, "got down to business" better, and seemed more inspired by a genuine desire to learn.

In line with this development is the fact that the meetings might not have been so successful if the ground had not been prepared by previous systematic discussions of the foremen's own problems. Merely to set up a group of supervisors and suggest that they ask questions about other departments might have rather weird effects. Unprepared, the average group of electrical foremen would enter upon such a program in a state of mind that might increase rather than diminish friction. But having acquired some sense of the importance of their own jobs, together with a realization that they still had much to learn, Ward Leonard Electric Company's foremen were "wide open" for the acquiring of information about other departments.

If every company in the electrical industry were to carry out a similar program with equal success, the dollars and cents result, expressed in quality and costs and general acceleration of organization progress, would be amazing.



Write for the Phenolite Manual

Know why Phenolite is replacing Hard Rubber, Metals, Porcelain and Glass, Wood. Find out how *you* can use Phenolite in many different ways, for many different purposes. Inform yourself as to its Toughness, Rigidity, Permanence, High Tensile and Dielectric Strength, Noiseless Operation, Resistance to Solvents and Moisture. The Phenolite Vest-Pocket Manual tells you how and why Phenolite punches, turns, mills, taps, threads, saws and drills with astonishing ease, speed, accuracy.

Read the facts that make the proof of Phenolite superiority. Then, let our Service Engineering Department help you determine whether or not Phenolite will bring you benefits of improved quality of product with added economy. Let these specialists help you determine which grade of Phenolite is best suited to your requirements. Our laboratory is the place "where known requirements meet known performance." Anyway, let us mail the Manual. Write for it today.

NATIONAL VULCANIZED FIBRE COMPANY, WILMINGTON, DEL., U. S. A.

Offices in Principal Cities

Seven Steps in Taking Inventory

An explanation of a practical plan that is easy to follow and that gives accurate results

(*Continued from page 29*)

Figure 2 is an inventory tag for work in process. It requires some explanation. Assuming that the standard operations on the work in process which is being inventoried are known, it is sufficient to enter in the designated space only the number and name of the last operation. This shows the condition of the work in process. If the sequence of operations is not known, however, it is necessary to count the number of pieces of work in process completed under each operation and to show in detail the operations completed on each piece.

In the "Condition" or "Last Operation" space, is written, information as to whether the goods are new, old, or usable. It is the practice sometimes to assign one or more men who possess sufficient information to special departments so that materials may be accurately described and last operations properly designated. The "Union of Count" may be the pound, the barrel, piece, etc. Metal tags rather than paper tags are attached to machinery and equipment, to furniture and fixtures, and also to assemblies.

As soon as inventory is completed in each department, the supervising authority is notified. Representatives of the supervising authority visit the department to see if everything has been inventoried. If so, tag-writers and others who have been working there are released and are assigned, if necessary, to other departments. The next step in inventorying is to pull—or detach—the original tags. No tags are pulled without the order of the supervising authority. After the tags have been pulled in a department regular operations may be resumed, provided they do not interfere with work in other departments. Tags pulled are sent to the supervising authority and compared with duplicate tags. If the tags do not agree, a recount of the material represented by the tag is ordered, if the discrepancy is large enough to warrant a recount. Someone other than the person who took the inventory makes the recount.

After the tags have been pulled, they are sorted according to the balance sheet classification of assets. The tags not only show quantities but also unit and total prices. In such cases the data on tags are entered on inventory sheets (Figures 3 and 4) which are in the charge of the supervising authority. After sheets are filled out they are sorted according to numerical sequence, are checked as to completeness, and are then re-sorted according to the balance sheet classification of assets. That is, all raw material items appear in one batch of sheets, work in process in another, and so on. The complete inventory is then recapitulated on summary sheets, consecutively numbered—one sheet showing the totals of each asset.

Pricing the Manufacturing Inventory—The pricing of the manufacturing or work in process inventory must necessarily be effected through the current cost records.

Every order representing the work in process has its time cards and requisitions filed in the work in process files, and if a physical inventory is taken, the notations on the physical inventory as to operations completed should agree with the information given by the cost files as to number of pieces completed under each operation, which also gives their cost.

The requisitions in like manner should also account for the direct material cost and what is on the floors in process, thereby taking care of this feature.

In adding up the time cards in the files and extending these totals on the inventory sheets representing the work in process, the extensions of the burden at the standard rates for each department will furnish the total of the work in process burden or overhead.

With these three items of work in process cost ascertained from both the physical count and the current cost files, it is then an easy matter to arrive at the totals and thereby check the controlling accounts in the ledger.

These costs are always carried at what is shown in the work in process files, it being absolutely impossible to alter them to agree with any market conditions as any change would be altogether impossible to accomplish.

Use of Records in Pricing—Raw materials may be priced from stock record sheets, purchasing department records, accounting department records, market quotations, or by the engineering department or the works engineer.

Some persons claim that work in process is difficult to inventory. If material requisitions and time tickets have been properly filed behind orders in the standing order files, or posted to cost sheets, the calculation of values of work in process is simply one of arithmetic. In some plants, cost sheets are not filled out until orders are completed, in which event the order files rather than cost sheets must be resorted to in figuring work in process inventories. This is the preferable method. Under process systems the stage of completion of work in process is ascertained, the total cost of each process is ascertained, and the total cost of all processes is calculated. Work in process cannot be so easily figured under an estimating system.

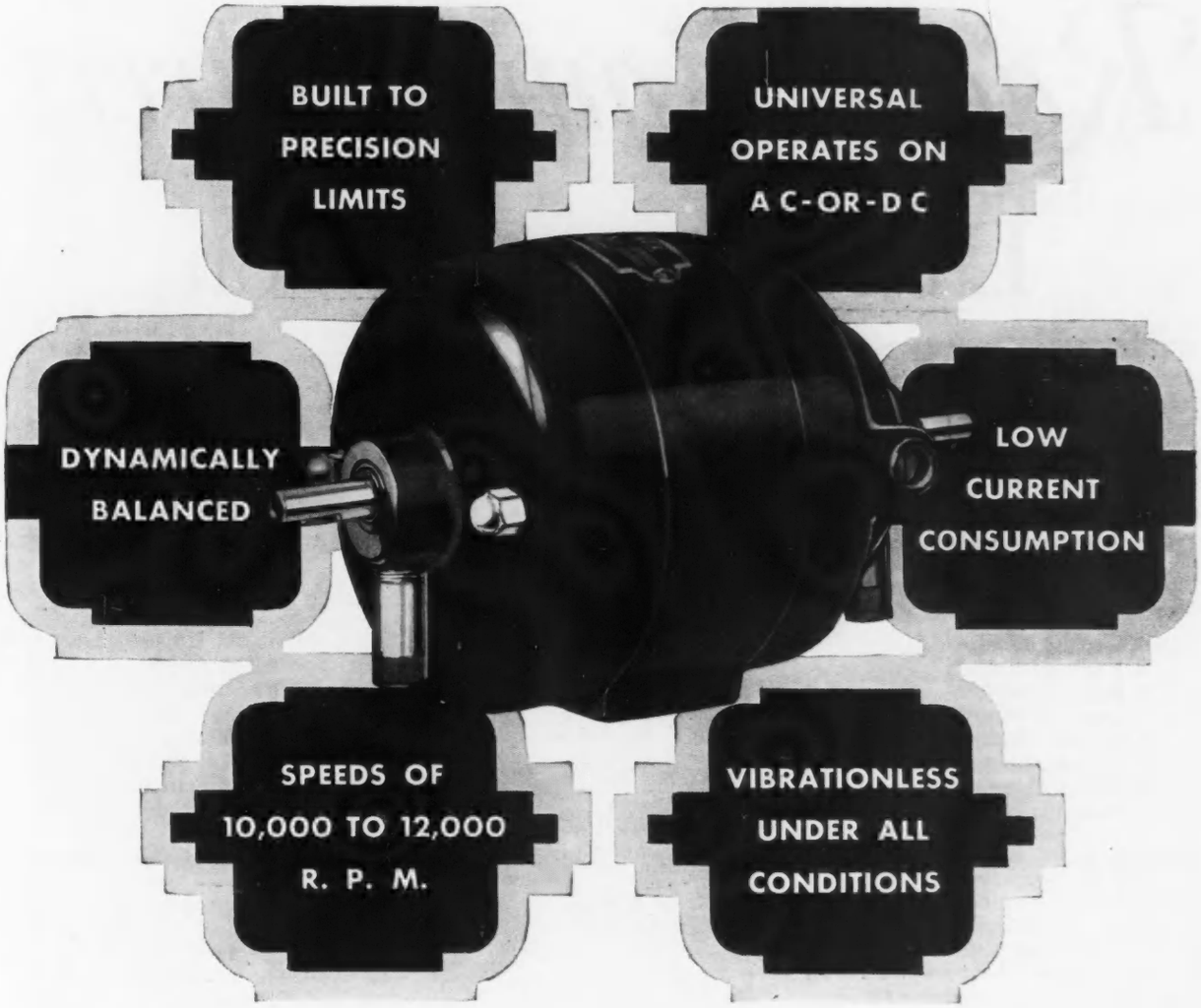
Finished parts and finished products are priced from individual part cost sheets, assembly cost sheets, estimated records, or stock record sheets.

All of the inventories should be priced at manufacturing cost. Selling and administrative overhead should not be capitalized in work in process, finished parts, and finished product inventories.

Final Steps in Taking Inventory — The supervising authority has charge of calculating, extending, checking, and comparing the inventory. Much of the detailed work is facilitated by the use of various mechanical devices. All calculations on inventory sheets should be made twice, and the extensions and figuring checked. Figure 3 is an inventory sheet for the physical inventory of material and supplies. The same form is used for finished materials or products. Figure 4 is an inventory sheet for the physical inventory of work in process. Two copies are made for each inventory sheet. The copies remain together until the inventory is priced. They are then separated and given to separate clerks who extend the values without any connection one with another. The sheets are then brought together and the extensions compared, a method which will immediately expose any extension requiring correction.

After the totals of the sheets which represent the material covered by each controlling account are ascertained, the controlling accounts may be verified and whatever adjustments are necessary can be made.

The inventory sheets are then separated and made up into books, one copy being filed away as a permanent record and a copy used for current stock records.


BUILT TO PRECISION LIMITS
UNIVERSAL OPERATES ON A C-OR-D C
DYNAMICALLY BALANCED
LOW CURRENT CONSUMPTION
SPEEDS OF 10,000 TO 12,000 R. P. M.
VIBRATIONLESS UNDER ALL CONDITIONS

Recognized Dumore Qualities!

THOUSANDS of Dumore Motors now in service attest Dumore fine qualities. To scores of manufacturers, using fractional horsepower motors, their dependable performance and precision manufacture are unanimously recognized.

Designed and built to meet almost any speed requirements, in sizes up to 1/4 horsepower, dynamically balanced to eliminate all vibration and constructed to precision limits with resulting long life Dumore Motors are unquestionably a final word in the small motor field.

DUMORE MOTORS
ARE USED IN
FLOOR POLISHERS
VACUUM CLEANERS
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ROUTING MACHINES
ELECTRIC DRILLS
ELECTRIC TOOLS
JEWELERS' TOOLS
and scores of other appliances

If your product demands a motor in which quality must be inherent, investigate Dumore. The services of our Engineering Research Department are available to you and in this regard our experience of over twenty-five years in the development of universal high-speed motors should prove valuable to you.

THE DUMORE COMPANY
35 Sixteenth Street Racine, Wis.

TRADE MARK
DUMORE
REG. U. S. PAT. OFFICE

FRACTIONAL HORSE POWER MOTORS ARE DYNAMICALLY BALANCED!

Radio Manufacturers Divided on Question *of Price Reduction*

The announcement of price cuts by some radio manufacturers and price maintenance by others has been an outstanding development in recent weeks. We present herewith a picture of the situation in general

THESE CUT

1. **Crosley Radio**
2. **Earl Radio**
3. **Kellogg Switchboard & Supply**
4. **Kolster Radio**
5. **Grigsby-Grunow**
6. **Radio Corp. of America**

THESE DIDN'T

1. **T. A. Edison**
2. **A. H. Grebe**
3. **Philadelphia Storage Battery**
4. **Stromberg-Carlson Telephone Manufacturing**
5. **Zenith Radio**

CROSLEY RADIO CORPORATION, CINCINNATI. The following reductions have been announced: Model 31-S, formerly $67, now $56.50; 33-S, formerly $115, now $112; 34-S, formerly $125, now $116; 41-S, formerly $85, now $65.85; 42-S, formerly $140, now $126; Dynacoil table speaker, formerly $28, now $21.10. Prices on all five receiver models do not include accessories.

EARL RADIO CORPORATION, NEW YORK. Lower price sets have not been reduced, but higher price receivers have been reduced considerably. The highest set in the Earl line, formerly $225, now sells for $162.50.

KELLOGG SWITCHBOARD & SUPPLY COMPANY, CHICAGO. Model 523, formerly listing at $250, less tubes, is now $175, less tubes. Model 524, formerly listing at $295, less tubes, is now $225, less tubes.

KOLSTER RADIO CORPORATION, NEWARK, N. J. Price reductions in the line of Brandes console receivers have been announced by L. T. Breck, vice-president. Model B-15, formerly listed at $125, now $97.50. B-16 has been reduced from $165 to $136.

GRIGSBY-GRUNOW COMPANY, CHICAGO. The prices on models 91 and 92 are now the same complete as they were formerly less tubes. Model 91 now sells at $137.50 complete and $116 less tubes, and model 92 now sells for $167.50 complete and $146 less tubes.

RADIO CORPORATION OF AMERICA, NEW YORK. The following reductions have been made on Radiola models: No. 44, formerly $110, now $75; No. 46, formerly $179, now $130 (d.c. model formerly $189, now $140); superhetrodyne model 60, formerly $130, now $98; loud speaker No. 103, formerly $22.50, now $18; No. 106, formerly $49.50, now $35.

THOMAS A. EDISON, INC., ORANGE, N. J. "Continued demand and complete absence of inventory problem enable us to assure you that no increases in our prices will be necessary during 1929, and naturally there will be no reductions," reads a statement from Alfred Walsh, vice-president.

A. H. GREBE & COMPANY, RICHMOND HILL, N. Y. There will be no reduction in the prices of A. H. Grebe receivers, Mr. Grebe stated: "Our receivers sell at a reasonable price and we cannot and will not attempt to compete with price slashing among less distinctive lines. Our market is among those desiring the perfected engineering product utilizing every new development in the radio art."

PHILADELPHIA STORAGE BATTERY COMPANY, PHILADELPHIA. An announcement by J. M. Skinner, vice-president and general manager said that the original schedule of prices made last June was so set that a price cut now was out of the question. Sales of Philco products in all parts of the United States, Canada and Mexico were entirely satisfactory, he said.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, ROCHESTER, N. Y. "Stromberg-Carlsons are priced fairly at the start. They are not sold through jobbers, but direct to dealers, thus permitting full value to go into the receiver itself. Stromberg-Carlson, making a custom-built receiver, does not overproduce."

ZENITH RADIO CORPORATION, CHICAGO. "The forced sale of distress merchandise at cut prices proves conclusively that the public has refused to purchase partially developed, inefficient screen grid sets, that radio buyers have refused to accept the obsolete non-screen grid type radio of last year's vintage."

★Chromalox Ring Units, Single or 3-heat, 2½" to 11" diameter, 110 or 220 volts. Used by leading makers of Electric Ranges, Waffle Bakers, Coffee Urns, Percolators, Sandwich Toasters, Incubators, Brooders, Infra-Red Ray Lamps, Health Baths, Melting Pots, Etc. Write for Bulletin C-106

Make your products *trouble-free* . . . . . from the start

Over 60 far-sighted manufacturers are doing it. Tests and experiments soon showed that it's more economical all around to equip products with patented Chromalox heating units.

IT'S like building an automobile . . . or a fine watch. The motor, the works, the insides must be right or it won't go. You are making appliances. Fine looking . . . latest designs . . . destined to be best-sellers.

The most important part of your product is out of sight

But what about the heating units that are out of sight and yet responsible for the every day successful operation of that waffle baker or electric range or water heater? Are they going to deliver the right heat everytime the switch is turned on?

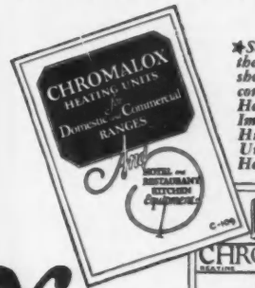
Not a single burn-out in 58,000 heaters

That report just comes from an ironing machine manufacturer. It's his five-year experience with Chromalox heaters. Other companies report similar satisfactory operating records. Your own products can be made just as trouble-free by using these patented Chromalox units.

Start now to make your products trouble-free

Customers call us in to show them the right way to build in the heating units. Result, assembly costs are lowered, trouble is side-tracked. Whether you are working on a new product or improving an old one, tell us about the appliances or heating devices you want properly heated. There's no obligation!

EDWIN L. WIEGAND CO.
7516 Thomas Blvd., . Pittsburgh, Pa.



★*Send for your copy of these 8-page bulletins showing the largest complete line of Strip Heaters, Ring Units, Immersion Heaters, High-Speed Range Units and Special Heaters.*

Chromalox
ELECTRIC HEATING UNITS

Electrical Manufacturing News

A department containing news, and descriptions of new materials, parts and devices for the manufacture and repair of electrical products

Fixture Men Meet in Washington February 9-15

The 1930 convention and fixture market of the Artistic Lighting Equipment Association will be held in Washington, D. C., Feb. 9-15, according to an announcement by Charles L. Benjamin, managing director of the association. Business sessions will be conducted at the Mayflower Hotel, while exhibits will be on view in the Washington Auditorium.

In addition to the regular business of the convention, there will be a number of practical talks by nationally known experts on illumination, manufacturing and marketing. The business sessions will be short so as to leave time for sight-seeing. Motor bus trips will be provided for all points of interest in the city.

At the fixture market in the Auditorium, dealers will have an opportunity to become acquainted with the newest designs in lighting equipment. Since the last fixture market, held nearly two years ago, many new designs have been created, particularly in the field of modern art. These will be shown for the first time at the fixture market in Washington.

The fixture market and the general sessions of the convention will be open to all lighting fixture manufacturers and dealers whether members of the Artistic Lighting Equipment Association or not, as well as to illuminating engineers, architects, building contractors, and others interested in improving the lighting of homes, stores, offices, schools, churches and public buildings.

National Mazda Lamps Become "G.E. Mazda Lamps"

National Mazda lamps, long a General Electric product, now take the name of General Electric Mazda lamps, according to an announcement by the National Lamp Works of General Electric Company, Cleveland.

"The new name, which is more fully descriptive of our product, will appear on the familiar blue carton of the National Lamp Works during the coming year," said J. E. Kewley, general sales manager of the National Lamp Works. It will be featured in all National Lamp Works advertising, beginning with January, 1930.

Radio Sales Now Increasing After Short Recession

Radio sales are now increasing after a temporary recession, it was stated by H. B. Richmond, president, Radio Manufacturers Association in announcing a call for a meeting of the R. M. A. directors at Briarcliff Lodge, New York, Dec. 6 and 7. This meeting was incidental to the industrial conferences initiated by President Hoover to stabilize and stimulate business conditions.

Recent surveys of the radio market, according to Mr. Richmond, indicated that although radio sales fell off somewhat during the last fortnight in October, coincident with the stock market slump, they are now on the upgrade. Sales are generally reported rising in this normally busy sales season.

Westinghouse Electric Supply Locates in 60 Cities

Nineteen electrical wholesale houses, with branches in 60 cities, comprise a new national system, the Westinghouse Electric Supply Company, which will enter the electrical supply business on Jan. 1, 1930. According to the announcement, each individual company will retain its local identity and its personnel and organization will remain essentially the same. In adopting the Westinghouse Electric Supply Company name, however, the facilities of each individual company will be increased considerably.

The following companies make up the new organization:

Alpha Electric Co., Inc., New York and Brooklyn; Commercial Electrical Supply Co., St. Louis and Memphis; Commercial Electric Supply Co., Detroit, Grand Rapids and Flint; Electric Appliance Co., Dallas, Houston, Tulsa, San Antonio, Harlington, Oklahoma City; Fobes Supply Co. of California, San Francisco and Oakland; Fobes Supply Co. of Montana, Butte and Spokane; Fobes Supply Co., Portland and Seattle; Great Northern Electric Appliance Co., St. Paul, Duluth, Minneapolis and Fargo; H. C. Roberts Electric Supply Co., Philadelphia, Baltimore, Washington, Wilmington, Reading, York, Allentown, Trenton; H. C. Roberts Electric Supply Co., Inc., Syracuse, Utica, Albany, Binghamton; Illinois Electric Co., Chicago and Peoria; Illinois Electric Co. of California, Los Angeles, Phoenix and Long Branch; Jules Andrae & Sons Co., Milwaukee, Waterloo, Madison, Des Moines, Mason City; McGraw Division, Jules Andrae & Sons Co., Omaha, Sioux City; Newark Electrical Supply Co., Newark, N. J.; Pierce Electric Co., Tampa, Jacksonville, Miami; The Erner Electric Co., Cleveland; The F. Bissell Co., Toledo; The Varney Electrical Supply Co., Indianapolis, Evansville; Wetmore-Savage Electric Supply Co., Boston, Bangor, Providence, Springfield, Worcester.

Headquarters offices of the company are maintained at 150 Broadway, New York City, and at 20 N. Wacker Drive, Chicago.

Electrical Equipment for the Ford Museum

HENRY FORD visited the Westinghouse East Pittsburgh works recently to see what is said to be the most complete exhibit in existence of pioneer electrical inventions. During his visit he was presented with the entire collection, which will be placed in the Dearborn Museum. Above, left, Frank A. Merrick and Mr. Ford

J-M ASBESTOS EBONY MOULDED

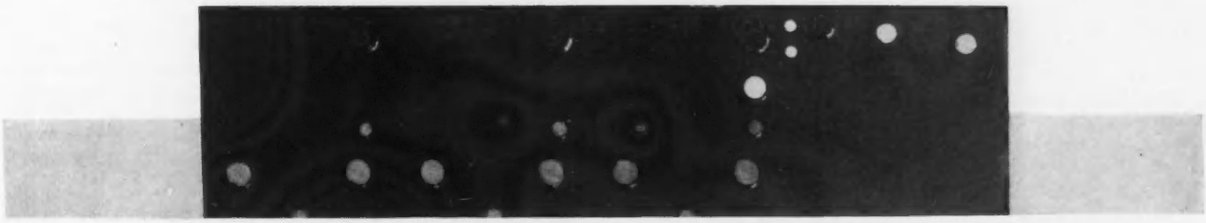
High Dielectric Strength, Moisture-Proof

JOHNS-MANVILLE Asbestos Ebony Moulded, long famous as a switchboard material, is now made available in moulded form to manufacturers of knife switches, starters and panel mounted control equipment.

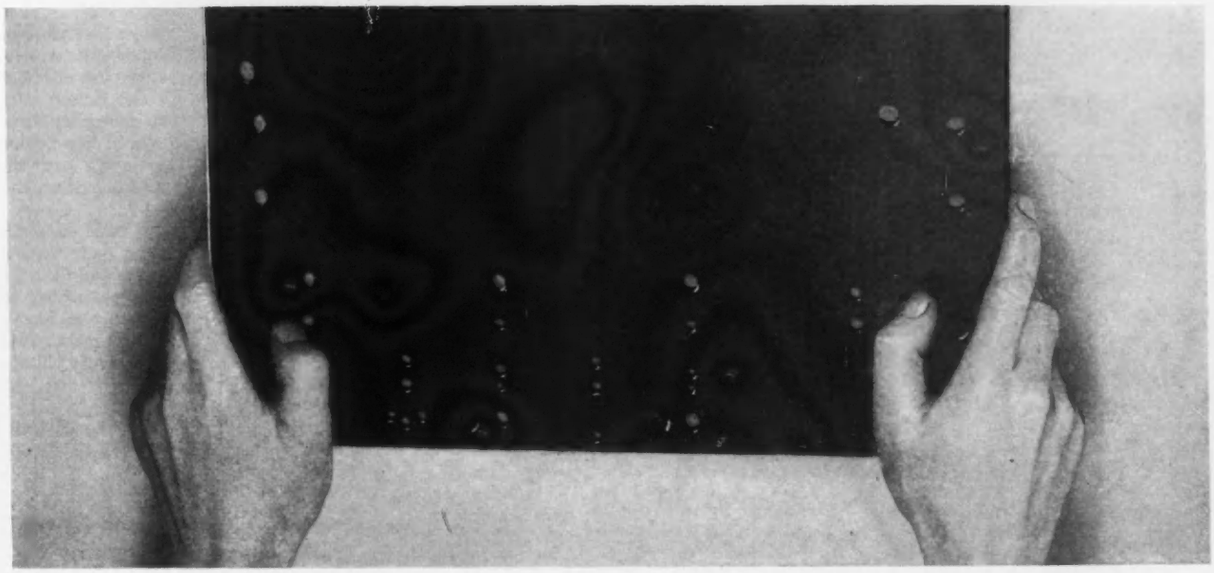
J-M Ebony Moulded, made in sizes as large as 500 square inches, provides an economical material with many advantages over other materials now in use. With J-M Ebony Moulded all holes, counter bores, slots, etc., are moulded into the finished piece, eliminating machine expense and breakage during fabrication. It has the special advantage of being *moisture-proof*. It will not absorb dampness from the atmosphere even when exposed to sea air. It does not warp or change shape in service and it is free from laminations.

The rugged mechanical properties and high dielectric strength of J-M Ebony Moulded are firmly established. It has long proved its superior qualities as a mount for industrial control apparatus in the products of the world's leading makers of electrical equipment.

We will gladly estimate on special forms and offer suggestions for the application of Johns-Manville Asbestos Ebony Moulded. Mail the coupon for further information and performance facts about this highly efficient, economical J-M product.



LARGE MOULDED BASES UP TO 500 SQUARE INCHES



Johns-Manville
ASBESTOS EBONY MOULDED

JOHNS-MANVILLE CORPORATION
New York Chicago Cleveland San Francisco Toronto
(*Branches in all large cities*)

Please send me booklet describing J-M Asbestos Ebony Moulded Insulation for electrical bases and parts. EL-1A

Name.....

Company.....

AE-10A 12

Address.....

Inca Manufacturing Corporation Will Triple Present Facilities

The construction of a large addition to the new factory of the Inca Manufacturing Corporation at Fort Wayne, Ind., was announced recently by officials of the company. The new unit will treble the capacity of the present plant.

An unusually attractive exterior will be one of the features of the plant. The new building will be 300 ft. long and 200 ft. wide. It is expected that the structure will be completed soon after the first of the year.

Homer Commutator Corporation in Strong Position

Homer Commutator Company, Cleveland, identified with the electrical industry for the past 37 years, was recently taken over by a new group, which is now called the Homer Commutator Corporation. Strong financial backing has enabled the new company to enlarge plant equipment with several types of new machines, thus increasing production considerably.

At the head of the Homer Commutator Corporation is George C. Paxton, president, for many years occupied with the manufacture and sales of commutators. James Parks, factory superintendent, and his associate, August Korman, are both recognized experts in the commutator field.

The company specializes in high speed commutators for small motors. A department is also maintained for building and refilling large power sizes of commutators. Plant and offices are located at 4748 Hough Ave., Cleveland.

Engberg Plant at St. Joseph, Mo., Is Sold

Engberg Electrical & Mechanical Works, St. Joseph, Mo., has been sold to the Troy Engine & Machine Company, Troy, Pa. The company will continue to operate as heretofore under the name of Engberg Division of Troy Engine & Machine Company. F. F. Von Buseck has been named general manager, replacing D. D. Merrill, connected with the company for the past 23 years, who has retired.

Trumbull Electric Manufacturing Forms New Company

Trumbull Electric Manufacturing Company, Plainville, Conn., has announced the formation of a new company, the A. G. Electric Manufacturing Company, Seattle, Wash., successor to the A. G. Manufacturing Company, in which the Trumbull Company has obtained a controlling financial interest.

The board of trustees of the new firm consists of A. E. Griswold, president and treasurer; W. E. Froude, secretary; J. H. Trumbull, vice-president; F. T. Wheeler, vice-president; H. Trumbull, assistant treasurer; S. S. Gwillim, assistant treasurer; A. S. Moody, trustee. For the present there will be no change in personnel. Safety switches, panelboards, switchboards and other accessories will comprise the company's line.

Television in Bottles

DR. VLADIMIR ZWORYKIN, radio engineer, has exhibited an entirely new television receiver. The pictures appear on the broad end of the tube he is shown holding in the view above

New Firm Handles Challenge Stamping and Enameling

A. H. Ringelberg, who has been connected with the Challenge Refrigerator Company of Grand Haven, Mich., for the past 23 years; E. O. Harbeck, who has been with the same company for seven years and Anton Fosheim, Carl Kleist and Harvey Bluthouse, also identified with the same organization for several years, have organized the Challenge Stamping and Porcelain Company to take over the metal forming, welding and vitreous enameling departments of the old company.

The company is particularly fitted to turn out refrigerator porcelain interiors and exteriors, having in the past manufactured about 30,000 sets a year for the Challenge Refrigerator Company. The firm's capacity for porcelain work enables it to handle about 40,000 units a week. It has turned out many thousands of feet of porcelain work for the Leonard Refrigerator Division of the Kelvinator Corporation, and at the present time is handling all porcelain work for Bastian Blessing Company, one of the largest soda fountain manufacturers in the country.

Radio Continues to Lead Electrical Exports

Due in part to a sharp increase in exports during September, the total value of exports of electrical apparatus during the first nine months of 1929 was $108,860,353, a gain of $29,349,586 over the same period last year, the Department of Commerce reported today. September exports totaled $13,116,984, almost double the figure for September, 1928.

The largest gain was in radio parts, which were $1,430,588 greater than in September last year, and for nine months almost double those of 1928. Exports of electrical equipment to Europe totaled $2,549,164, a gain of $1,476,349 over the corresponding month last year. Great Britain, France and Germany were the largest purchasers.

Exports to the Western Hemisphere aggregated $4,106,578 in September, an increase of $1,377,017 over September, 1928. Canada, Chile and Mexico were the largest markets.

W. L. Goodwin Elected President of Armstrong Electric & Mfg.

The board of directors of the Armstrong Electric & Manufacturing Corp., Huntington, W. Va., has elected William L. Goodwin president of the company.

W. L. Goodwin

Mr. Goodwin organized an electrical jobbing business in California 30 years ago, which grew to be one of the largest businesses of its kind in the country. He came East under the sponsorship of General Electric Co., to promote a cooperative merchandising plan for the electrical business known as the Goodwin Plan. This work led to the election of Mr. Goodwin as operating vice-president of The Society for Electrical Development. He resigned from this position three years ago to enter private business as merchandising counsellor, as president of the firm of Goodwin, Morton & Badrian, Inc.

G. E. Issues New Series of Decorative Lamps

General Electric Company's incandescent lamp department has announced a new series of seven Mazda lamps for distribution through the National and Edison sales divisions. This new group comprises three definite shapes, two of them in three-color combinations each. The lamps are referred to as candle, gothic and modernistic flame.

The candle shaped lamp made in plain ivory, list at 75 cents. For more severe styles of architecture, brackets and fixtures there is the gothic type lamps, which is furnished in plain ivory, black on ivory, and rose on gold. It lists at 50 cents. The third shape is made in plain ivory, black on ivory and rose on gold. It lists at 50 cents.

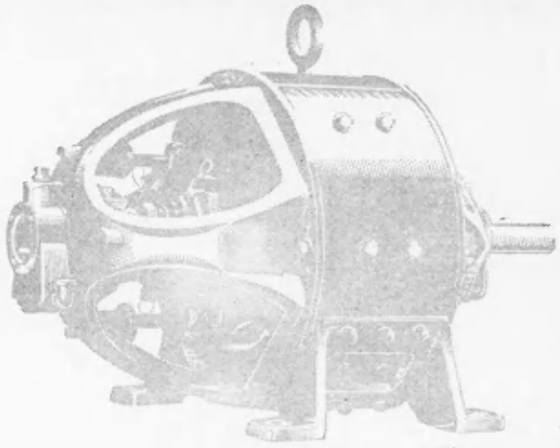
Each of these lamps is of the 25-watt medium screw base, 110-115-120 volt variety.

New York Power Show Opens As Engineers Meet

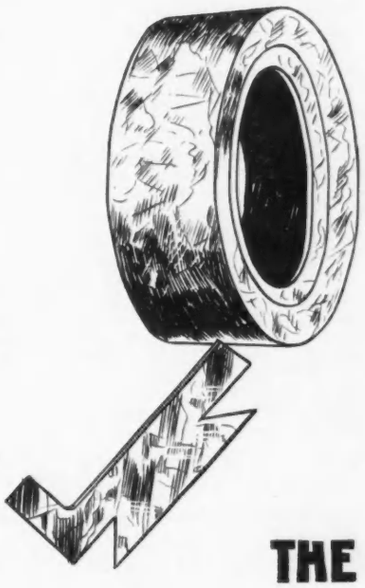
Coincident with the fiftieth annual convention of the American Society of Mechanical Engineers in New York, Dec. 2, the eighth annual exposition of power and mechanical engineering was held in the Grand Central Palace, New York, Dec. 2-9.

More than 2000 delegates from the United States and Canada were on hand. Later in the week several other association meetings were held.

MACALLEN MICA



HUNDREDS OF DOLLARS SAFEGUARDED BY PENNIES!



The cost of mica parts in a costly motor or other equipment is but a very small part of the whole.

And it seems like wisdom to use only mica parts which assure dependability.

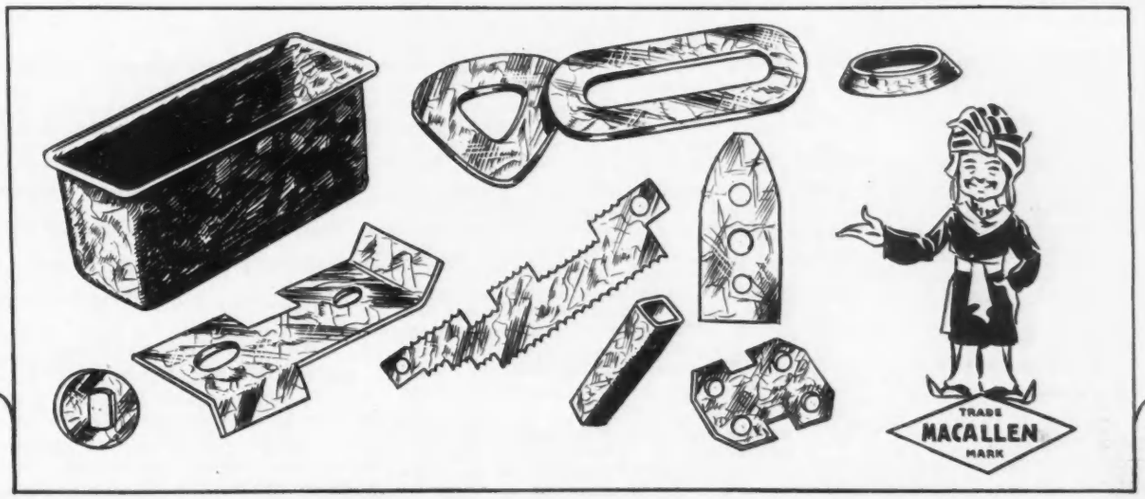
MACALLEN MICA MOTOR PARTS

are recognized everywhere, where mica is used, as the utmost in reliability and uniformity. The reliability insures, insofar as the mica parts are concerned, trouble-free performance and the uniformity assures low assembly costs.

Write for further information.

THE MACALLEN COMPANY BOSTON 27 MASS.

CHICAGO — CLEVELAND



Suttle Equipment Company Names T. H. Endicott President

Thomas H. Endicott, for three years general sales manager of the Zenith Radio Corporation, is now vice-president and general sales manager of the Suttle Equipment Company, Wrigley Building, Chicago. Mr. Endicott has spent many years in the electrical industry and is well known to the distribution field.

T. H. Endicott

Suttle Equipment Company is making a line of electrical appliances which includes a portable clothes washer designed particularly for the apartment trade; a clothes dryer with electric hot air drying principle, a portable dish washer and a portable exercising machine.

New Distributor and Fabricator of Laminated Textolite

Electrical Insulation Corporation has announced through its general manager, E. W. Patterson, that it has been appointed Western distributor and fabricator of Laminated Textolite, a General Electric product. The company maintains offices at 308 W. Washington St., Chicago, with main fabricating plant at Crystal Lake, Ill.

E. W. Patterson

Electrical Insulation Corporation is headed by E. F. Bessey, president. E. W. Patterson, vice-president and general manager of the company, has been identified with electrical enterprises in the Middle West for many years having represented several manufacturers in that territory.

Mack Molding Company Located in New Quarters

Mack Molding Company, Inc., Wayne, N. J., is now occupying its newly purchased plant comprising two acres of land and 55,000 sq. ft. of floor space. Besides installing additional equipment in the tool room the company has increased its potential molding production 30 per cent by acquiring additional presses, including some of the latest models obtainable.

Brevities

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces that company employees who retire at the age of 65 years or older will be guaranteed substantial incomes for the remainder of their lives, as the result of the institution of a new andscientific annuity payment plan. Affecting all the 50,000 workers on the Westinghouse payroll, the plan is one of the largest in scope and one of the first of its type ever to be established.

Coming Conventions

American Institute of Electrical Engineers.—Annual winter meeting at New York City, Jan. 27-31, 1930.

American Society of Heating and Ventilating Engineers.—Annual meeting in Philadelphia, Jan. 27-31, 1930. During the same week, International Heating and Ventilating Exposition at the Commercial Museum, Philadelphia.

Artistic Lighting Equipment Association. — 1930 convention and fixture market, Washington, D. C., Feb. 9-15, 1930. Business sessions at the Mayflower Hotel; exhibition at the Washington Auditorium.

Factory and Production Exposition.—Chicago, March 3-7, 1930.

National Electric Light Association.—Annual convention, San Francisco, Cal., week of June 16, 1930.

Factory and Production Exposition.—(Management of Midwestern Exposition, Inc.) To be held at Chicago, March 3-7, 1930. Labor saving, material handling, new construction materials and designs.

Radio Manufacturers Association.—Annual convention and exhibition, at Atlantic City, N. J., week of June 2, 1930.

Time-O-Stat Controls Company, Elkhart, Ind., has just completed two new wings and will soon be using 79,000 additional sq. ft. of space. Production demands since the summer have called for constant increases in the working force.

Wagner Electric Corporation, St. Louis, has named as representative in 64 counties in Iowa, with headquarters in Des Moines, D. O. Reardon, for the past seven years Iowa representative for Westinghouse Electric & Manufacturing Company.

Van Horne Tube Company has opened an office and warehouse in Chicago, from which point all adjacent territories will be served. Eastern accounts are shipped from Franklin, Ohio, and western accounts will hereafter be handled from Chicago, office at 108 W. Lake St.

Cutler-Hammer, Inc., Milwaukee, has moved the St. Louis district sales office from 611 Olive St. to 1914 Washington Ave., where a warehouse covering 4000 sq. ft. of floor space has been established, serving Kansas, Missouri, Arkansas, Southern Illinois, Southern New Mexico and parts of Tennessee, Kentucky and Indiana.

Allis-Chalmers Manufacturing Company, Milwaukee, has appointed A. D. Brown as district manager of the Buffalo, N. Y., office, to succeed M. W. Phelps, resigned.

Resilient Terminals Company, 88 Tenth St., Oakland, Cal., seeks agents in Chicago, St. Louis, Kansas City, Boston, New York and other eastern cities. The company manufactures the complete line of "Unicord" attachment plugs.

Marvin Radio Tube Corporation has moved its research and engineering development laboratories from Broad St. in Newark, N. J., to the company's key plant, Irvington, N. J. The firm's sales offices have been moved from 225 Broadway, New York, to Irvington, N. J.

Young Radiator Company, Racine, Wis., reports that production of industrial type internal combustion engine cooling radiators for trucks, power units, compressors and industrial machinery has reached the peak in this company's history.

Sylvania Products Company, Emporium, Pa., has completed a new plant, three stories in height with over 100,000 sq. ft. of floor space. The plant houses 1000 employees and produces 45,000 radio tubes a day.

American Electric Fusion Corporation, 2610 Diversey Ave., Chicago, has appointed the R. D. Thomas Company of Philadelphia, as agent for AEF spot, seam and tube welders in Philadelphia and surrounding territory.

RCA-Victor Company, Inc., which begins operations Jan. 1, 1930, has named as vice-president and general counsel, Major I. E. Lambert and as treasurer and controller, E. C. Grimley.

CeCo Manufacturing Company, Providence, R. I., has appointed N. O. Williams, chief engineer of the company, as works manager.

Westinghouse Electric & Manufacturing Company, E. Pittsburgh, Pa., has received an order for 25 type NAB Nofuz panelboards, totaling approximately 450 circuits from the United Engineers & Constructors, Inc., for use in the Chesapeake & Ohio Railroad Building at Huntington, W. Va. This marks the first application of Nofuz panelboard to the railway field. Nofuz panelboards are equipped with circuit breakers instead of the conventional switch and fuse for controlling the branch circuits.

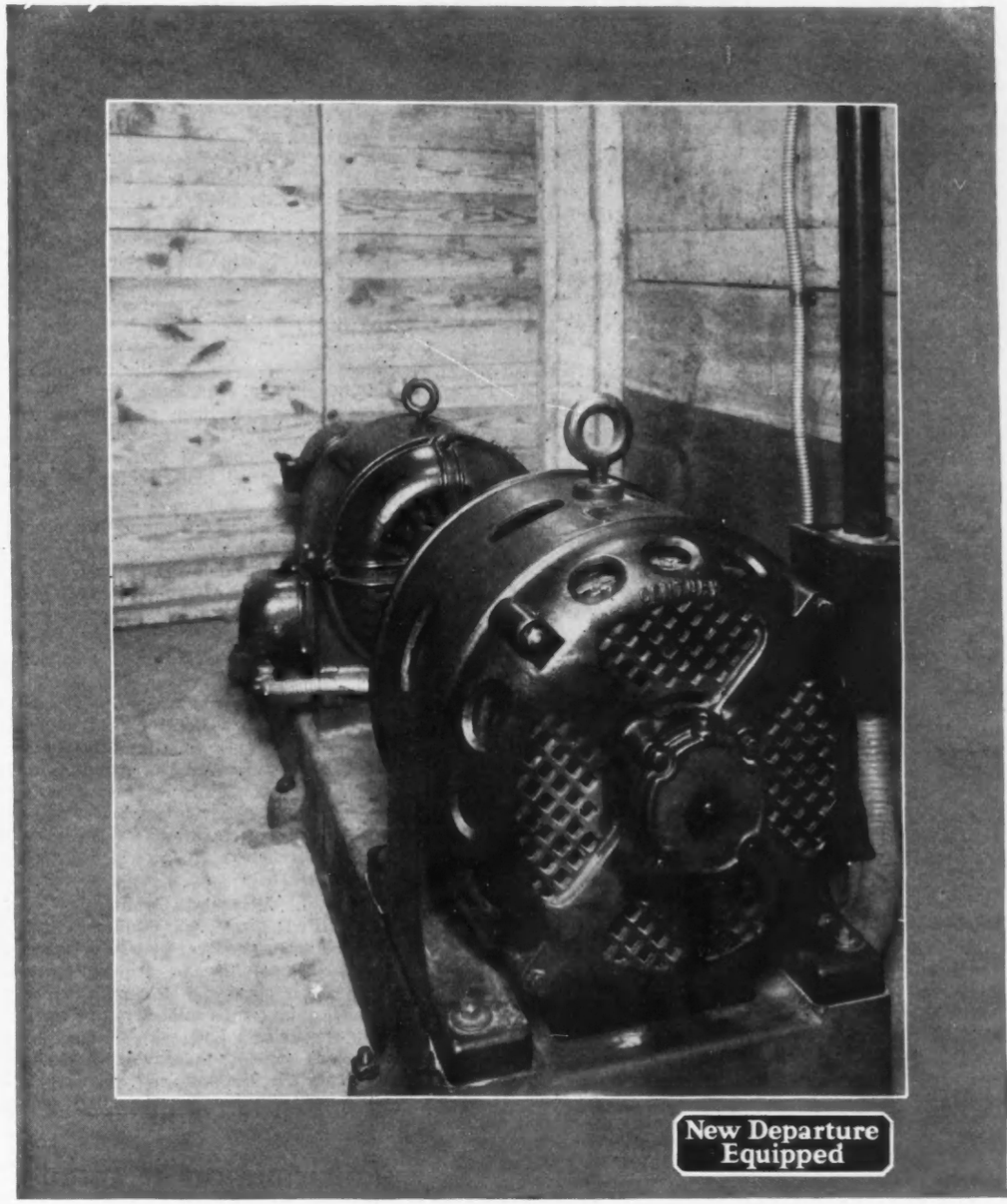
DeForest Radio Company, Jersey City, N. J., has appointed G. J. Hallam as general sales manager.

American Bosch Magneto Corporation, Springfield, Mass., has begun construction on a new addition to its present plant "A", on North Main St., Springfield. When completed it will house modern heat-treating and hardening rooms, a new sand blasting room, a department for scrap reclaiming, store rooms for maintenance supplies, packing and shipping materials and an up to date shipping department. It is expected that occupance will be ready before the new year.

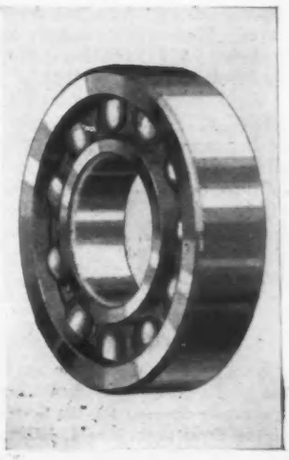
Financial

American Brown Boveri

Although American Brown Boveri Electric Corporation reported a deficit of $131,586 for the September quarter this year, against profits in the two previous quarters, the less favorable showing is chiefly attributable to the charging off of large development expenses. Previously it had been



YOU will find New Departure-equipped Century motors in all industries. You will find praise for their performance, too . . . . . praise justly earned, for they are electrically efficient and mechanically accurate. They run for months between each application of lubricant. New Departures reduce burnouts by eliminating one of their prime causes, de-centered armatures. Being practically frictionless and wear-proof, New Departures never need readjustments throughout their long life. The New Departure Mfg. Co., Bristol, Connecticut. o o o NOTHING ROLLS LIKE A BALL



NEW DEPARTURE
BALL BEARINGS

1262

the practice to defer some of these charges and absorb them over a longer period.

Volume of business booked by American Brown Boveri this year shows a substantial gain over 1928 in all departments. Aside from contracts for seven vessels, two for the United States Government, the electrical division also has shown a big gain in business.

In an analysis of the company's income account for the nine months this year, it is significant that operating profit of $1,264,008 was the largest reported since the company was organized. Against all of 1928 it showed a gain of $218,336, and $908,781 over 1927. Other income for the nine months totaled $191,139, and exceeded that for all of 1928 by substantially $50,000.

CeCo Manufacturing

The large expansion of the tube division of the radio industry is emphatically evidenced in a comparison of the assets of the CeCo Manufacturing Company, Providence, R. I., for the years of 1924 and 1929.

The balance sheet of 1924 showed assets of approximately $24,000. The balance sheet as of October, 1929, shows assets of approximately $2,500,000.

Cutler-Hammer

Cutler-Hammer, Inc., is closing the best year in its history. Probability is that net income will be in excess of $2,200,000 after all charges, including taxes and depreciation, or better than $8 a share on the 275,000 shares of no par common issued.

This would compare with the previous record net of $1,891,009, or $6.87 a share, in 1926 on present capital basis and with $1,441,218, or $5.24 a share, in 1928.

For the first six months this year Cutler-Hammer netted $1,123,152 after all charges or within $318,066 of the net reported for all of 1928. Compared with the first half in 1928, when net totaled $614,136, after charges, there was a gain of 82 per cent. This large increase was partly attributable to higher prices in addition to improved business.

General Electric

General Electric Company is closing the best year in its history. Orders this year will top the $400,000,000 mark while net income is likely to approach $68,000,000, after all charges including depreciation and taxes. These would compare with previous records of $348,848,512 and $54,153,806, respectively, attained in 1928.

To September 30, this year, bookings totaled $337,404,470, or within $11,444,042 of the record of $348,848,512 reported for all of 1928. Against the first nine months of 1928, this year's business showed a gain of 29 per cent while compared with the entire year 1919, there was an increase of almost $100,000,000, or in excess of 40 per cent.

Grigsby-Grunow

Net profits, sales volume and factory output of the Grigsby-Grunow Company were practically doubled for the first five months of the fiscal year June 1, 1929, to Oct. 31, 1929, over the corresponding period a year ago, according to a statement made by B. J. Grigsby, president of the company.

Sales show an increase of $20,057,924. Net profits show an increase of $2,235,938, or 115 per cent. Output of radio sets increased from 3000 to 6000 daily. October was a banner month in the history of the company in sales and earnings. Sales for the month nearly doubled October, 1928, totaling $10,057,039. Net profits for the month amounted to $1,239,027.

Kelvinator

An increase of 150 per cent in the shipments of Kelvinator Corporation for the first half of November, as compared with the period of 1928, was reported recently by J. W. Buritt, vice-president. He also reported an increase of 500 per cent in orders for future delivery up to Nov. 16, 1929, as compared with the first 15 days of 1928.

Perryman Electric

Perryman Electric Company, Inc., announces that sales for October were $230,000, as compared with $176,202 in September and $136,000 for the corresponding month of last year. According to H. Burbank Foster, vice-president and general manager, the demand for screen grid tubes continues unabated.

Polymet Manufacturing

Polymet Manufacturing Corporation reports for quarter ended Oct. 31, 1929, net profit of $363,019, after charges and taxes, equivalent to $2.02 a share on 180,000 no-par shares of stock.

October net profit was $138,692, after taxes and charges.

Robbins & Myers

Net profits of Robbins & Myers, Inc., Springfield, Ohio, and the Robbins & Myers Company of Canada, Ltd., Brantford, Ont., for the fiscal year ending Aug. 31, 1929, were $300,704.37 after all charges but Federal taxes. Federal income tax and the Dominion tax total $29,803.32, net profits after taxes being $270,901.05, which earnings are equivalent to $1.50 a share on the $25 par value preferred stock, plus approximately 95 cents a share on the outstanding common stock.

Unfilled orders on Aug 31, 1929, were 61 per cent greater than on Aug. 31, 1928.

Temple Corp.

The Temple Corporation, Chicago, completed, in October, the most successful month in its history, according to Paul G. Andres, vice-president and chief engineer.

The firm manufactured and shipped $1,100,000 worth of Templetone receivers between Oct. 1 and Oct. 31, he said. Mr. Andres said also that the local plant was 30,000 sets behind on orders, despite the fact that the daily production is around the 1000 mark.

A large percentage of the orders on hand, Mr. Andres said, is for radio and phonograph combinations. Public demand for the Temple combination has far exceeded expectations, he said.

Manufacturers Literature

ELECTRICAL MANUFACTURING *presents a digest of recently issued catalogs, bulletins and other advertising material. Manufacturers are invited to send literature for review in this column.*

Lincoln Electric Company, Cleveland. A bulletin entitled, "Arc Welding of Pipe Lines," describes the use of electric arc welding processes as applied specifically to pipe line construction. This bulletin is written by J. F. Lincoln, president of the company which sponsored the first major pipe line to be electrically arc welded. Types of joints, methods of construction, firing line welding, bell hole welding, welding speeds, equipment, inspection and testing are the general subjects discussed and illustrated.

Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa. Booklet C-1861 and leaflet number 20440 are two new issues of this company. The former deals with the application, distinctive features, construction and advantages of outdoor switchhouses with manual, motor or solenoid-operated oil circuit breakers. General and equipment specifications are listed in full for each of the three different types of circuit breakers. Leaflet 20440 describes the operation of sectionalizing equipments for use on stub-end feeders, multiple feeders and voltage sectionalizing feeders in railway distribution systems. There are several diagrams and photographs.

Edwin L. Wiegand Company, 7500 Thomas Blvd., Pittsburgh. Bulletin C-108 lists, illustrates, describes and gives prices for this company's lines of strip and space, as well as air heaters. All items listed in this publication can be shipped out of stock on short notice. Last year's issue of 10,000 was quickly taken up by plants throughout the country, and this year's printing of 13,000 is more than half consumed.

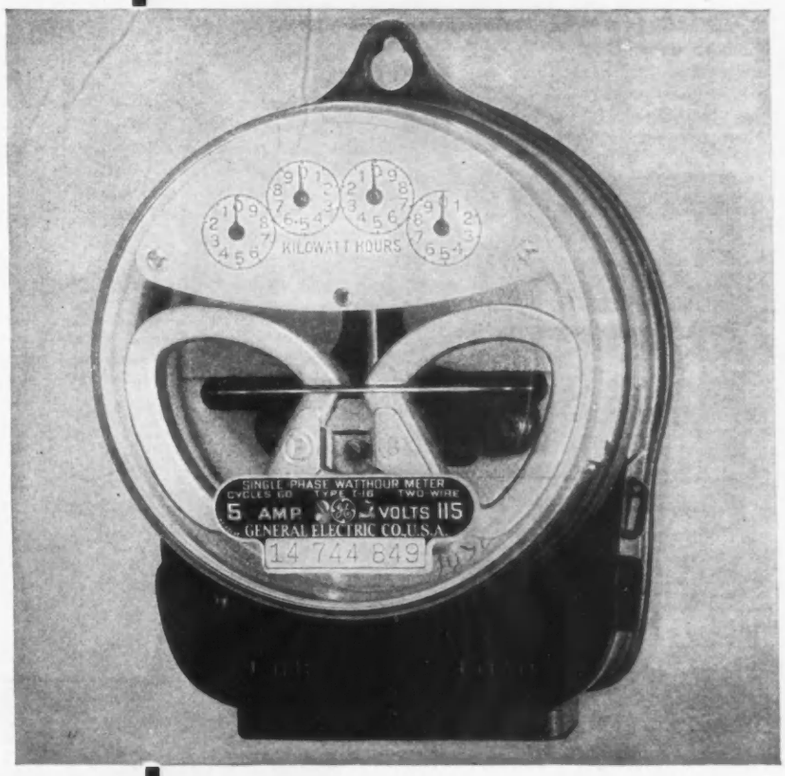
Information Wanted

We have been asked for the names and addresses of manufacturers of the articles listed herewith.

Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of ELECTRICAL MANUFACTURING, 461 Eighth Avenue, New York City.

"Burrows" Therapeutic Lamp.
"L. R. Co." Receptacles.
"Williams" Commutator Dressing.
"Flint" Waffle Iron.
"Pioneer" House Pump.
"Defiance" Cigarette Lighter.
"Hillcrest" Line of Lighting Fixtures.
"Thermodyne" Therapeutic Lamp.
"Medsco Beauty" Iron.
"Seco" Plug Fuses.
"Aspinall" Soldering Fluid.
"Indulet" Fittings.

Electromatic Traffic Dispatch asked for in our November issue is manufactured by Automatic Signal Corp., 205 Church, New Haven, Conn.



This electric meter, made by the General Electric Company, is protected and beautified by Aluminum Paint.

An EXCELLENT FINISH *for metal Instruments*

ECONOMY and utility are secured for metal production jobs requiring a surface finish, through the use of Aluminum Paint.

No other paint covering offers the same bright, silvery metallic finish or affords a more practical, durable protection against rust and corrosion.

Aluminum Paint's metallic film is impervious to moisture, is slow to discolor, even in the presence of fumes or smoke, and can easily be kept clean and bright.

The booklet, Aluminum Paint, visualizes and discusses many industrial uses for this modern paint. Let us send you a copy.

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ALBRON
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The pigment base for the better grades of Aluminum Paint is Albron—made from pure ALCOA Aluminum.

ALUMINUM PAINT
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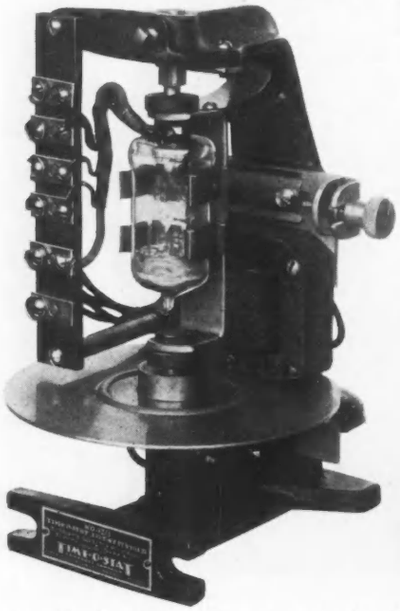
New Goods for Your Inspection

Disk Sign Flasher

Time-O-Stat Controls Co., Elkhart, Ind., has placed on the market a disk sign flasher of the on-and-off type incorporating the contactor mercury tube switch. The flasher has a copper disk inserted into an electrical field, with a magnet placed so that the disk cuts the lines of force perpendicularly when an alternating current is impressed



into the circuit. Another magnet is placed beneath this disk but not directly under the other magnet. The lines of force are then cut in a horizontal direction by one magnet and in a perpendicular direction by the other. This action creates a force which propels the disk and imparts the desired motion to the shaft upon which it is mounted.

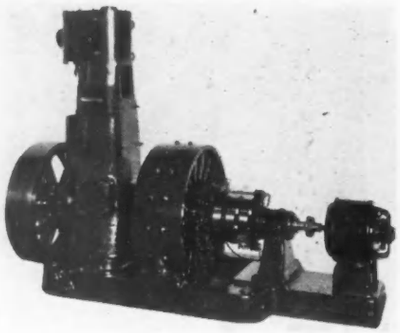
Resistance Tester

James G. Biddle, 1211 Arch St., Philadelphia, Pa., is offering a "Megger" instrument called the "Bridge-Meg" Resistance Tester. It is used for measuring resistances from 0.01 ohm up to 100 meg-

ohms. This instrument combines in one unit facilities for making Wheatstone Bridge measurements of conductor resistance at 250 volts, and also "Megger" tests of insulation resistance at 500 volts. The device weighs 12¾ lb. and measures 7 by 8¾ by 12 in. With it are included the necessary dial resistances for "Bridge" tests, a direct reading ohmmeter for "Megger" tests, and a 500 volt D.C. constant pressure hand generator for current supply. An important feature of the hand generator is a slip-clutch arrangement by which a constant potential is delivered when the hand crank is turned at or above its rated speed of about 160 r.p.m. This feature makes it possible to use the instrument as a "Bridge" under all conditions, including tests where a considerable amount of self-induction is present. It may be also used as a "Meg" for insulation resistance tests under all conditions with large apparatus and long cables where there is usually a considerable amount of electrostatic capacity.

A.C. Generating Set

Engberg Division of the Troy Engine & Machine Co., St. Joseph, Mich., is manufacturing a small A.C. generating set that is compact in construction and has both direct connected alternator and exciter. They incorporate the standard Engberg fully inclosed, self-oiling, automatic steam



engine. These machines have been designed to supply the demand for small A.C. generators in standby service, or to carry night and holiday as well as peak loads.

They are available in sizes from 5 to 75 kv-a. and for direct current from 3½ to 60 kw.

"Explosion-Proof" Motor

The Louis Allis Co., Milwaukee, Wis., is manufacturing a Type E "Explosion-Proof," self-ventilated squirrel cage motor in sizes range from ¼ to 25 hp.

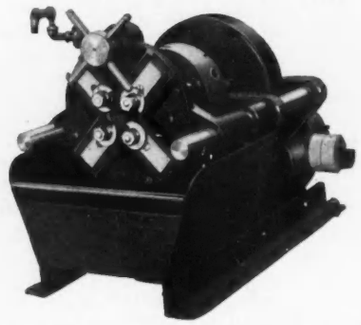
The motor proper is built in a totally inclosed metal casing, which consists of a

welded steel stator unit and two cast-iron bearing brackets held together by eight heavy tie bolts. The mechanical design of this inclosed casing incorporates two of the explosion-proof features of the motor, namely: the ability to retain the flame, and the strength to withstand the pressure, in the event of an internal explosion. The strength is provided by heavy construction throughout the motor. The ability to retain flame is provided by long close clearances at the shaft openings and casing joints. These close clearances embody the principle upon which the motor is built: namely, that flame will not propagate through an opening in metal providing the size of opening is within, and the length of flame path above, certain limits.

The motor proper is surrounded by an outer sheet steel shell large enough to allow a ½-in. air passage around the motor. A blast of cooling air is forced through this passage and over the motor by an aluminum (a non-sparking metal) fan mounted on an auxiliary shaft extension.

Pipe Threading Machine

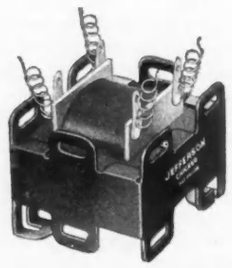
Toledo Pipe Threading Machine Co., Toledo, Ohio, has introduced a portable electrically driven pipe threading machine, No. 999. It will thread pipe from ½ in. to 2 in. in diameter. It will thread a 2-in. pipe in 30 seconds. This machine is driven by a ½-hp., 110-volt, universal motor operating from any lamp socket. Separate



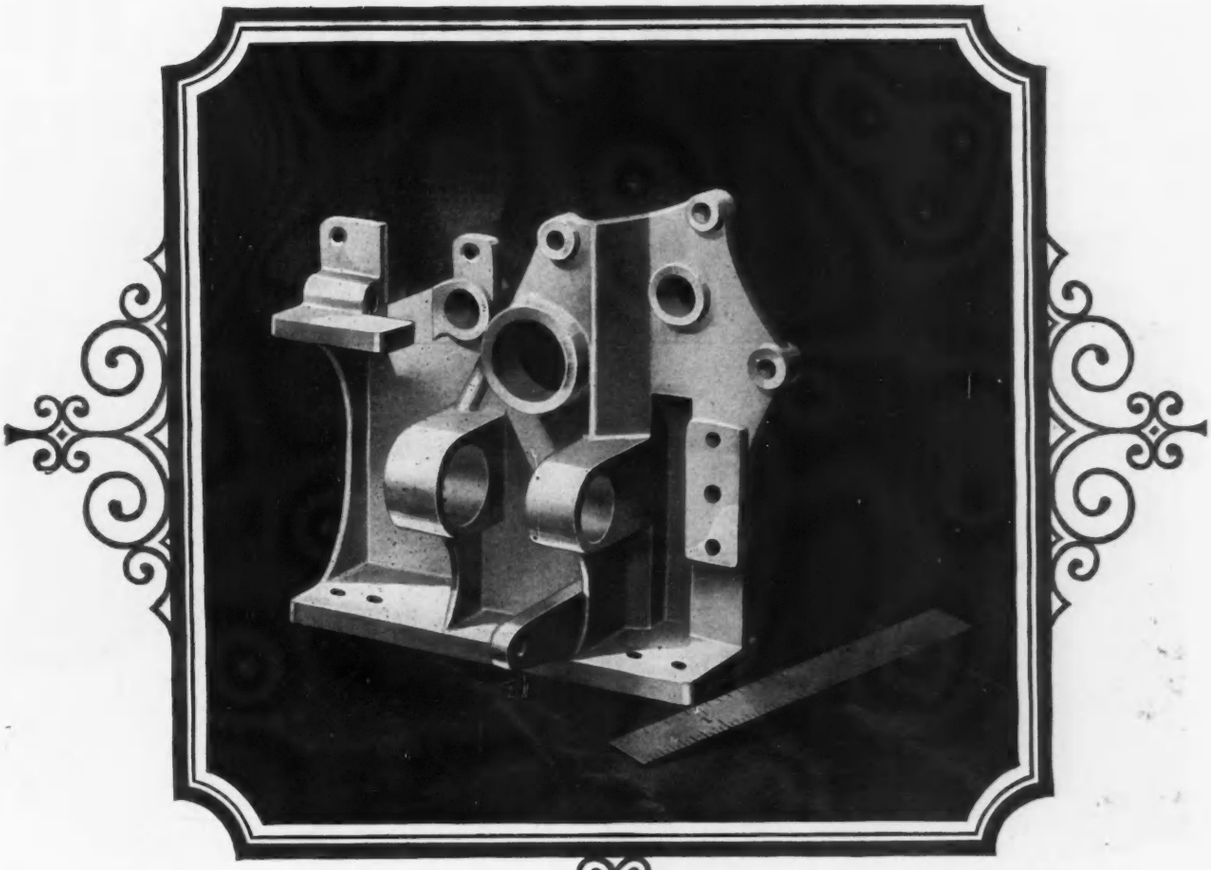
die heads are provided for each size of thread. An oil pump insures a constant stream of oil on the work while threading. There are no gear-shift levers. Ten feet of rubber-covered cable and attachment plug are provided for each machine. Net weight of machine is 265 lb.; can be carried by two men. Dimensions of machine are 32 by 16 by 20 in.

Replacement Transformer

Jefferson Elec. Co., 1505 S. Laflin St., Chicago, offers the trade its audio replacement transformer for all radio receiving sets, No. 371. It measures 1¾ by 2⅜ by 2 in., and will fit under or over the subbase. It may be used for either A.C. or D.C. sets. Lugs and leads are furnished,



and it is unnecessary in applying this transformer to redrill the base of the receiver. The core of the transformer is of the shell type and is made of silicon steel. Two types of connections are supplied—lugs and flexible silver leads.



Distinctive Differences

To the veteran user of the products of the die caster's art, the refinements in Newton Castings are vividly real —the perfection of the dies, the mastery in alloying metals, the care in the making of each casting, the thoroughness in inspection—

All these sum up to define that quality which commands a growing preference—

Newton Service, indicative of judgment and experience, is likewise gaining in preference.

NDC 16

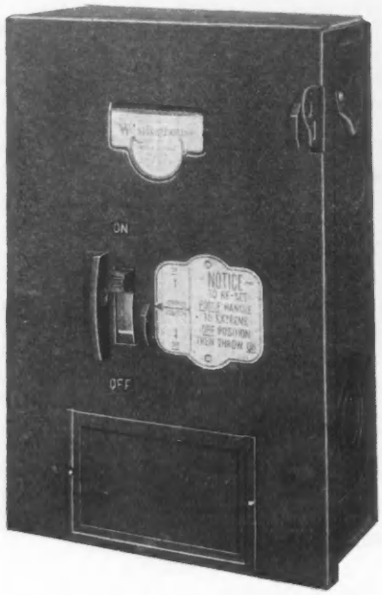
The NEWTON DIE CASTING Corp'n.

146 Munson St. NEWTON NEW HAVEN New Haven, Conn.

Meter Service Breaker

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces the development of a positive automatic circuit breaker in the WK-50 meter service breaker. It is safer than fuses because its performance cannot be easily altered by adverse conditions. Because of its long time element, it withstands temporary overloads, but it will open the line before any damage can be done to the equipment or to the insulation of the conductors.

The service breaker is operated by a toggle switch, being quick make and quick



break, thus eliminating contact burning and variable action. It is operated from the front by an insulated handle, which can be locked or sealed in the off position if desired.

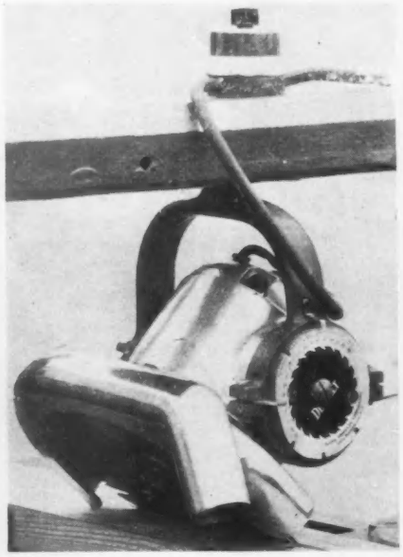
External connections make it unnecessary to disturb the circuit breaker and facilitate wiring. All parts are cadmium plated to reduce corrosion or are of non-corrosive materials to prevent moving parts from adhering.

The WK-50 service breaker is for 30 ampere, 125 volts, 2 wire, solid neutral service. It bears the Underwriters' Laboratories label as a device approved for entrance use as required by the National Electric Code.

Dewalt Junior Woodworker

The Dewalt Products Corp., Leola, Pa., announce the addition of the Dewalt Junior to their line of all-purpose woodworkers. It incorporates the features of the Wonder-Worker with balanced, guided power applied to the saw in all cutting positions, instant change from cross-cutting to ripping without stopping the motor and accurate ripping gage and dials for adjustment to any position. This individual machine, which is operated by a fractional horsepower motor will handle 29 different cutting operations, including dadoing, routing, mitering, shaping, grooving, ploughing, rabbeting, mortising, tenoning and gaining.

With a 12-in. combination cross-cut and rip saw, which is standard, the Dewalt Junior will rip 2-in. stock at the rate of 20 linear feet per minute. Fitted on a wooden table 29 by 59 in., the complete machine weighs 235 lb. It is compact and readily portable. Another feature of



the machine is the roller bearing arm making for easy operation.

Standard equipment includes an adjustable guard that fits down to the work and gives positive protection to the operator.

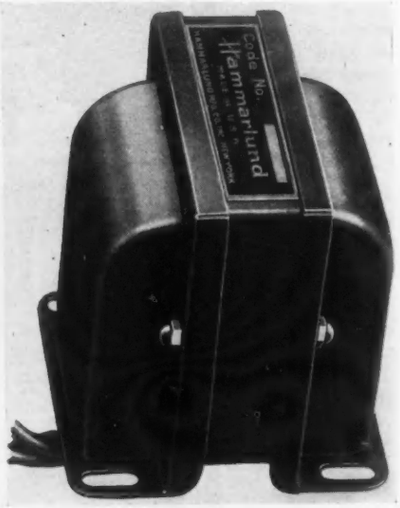
Booster Auto Transformers

Sorgel Elec. Co., 91 W. Water St., Milwaukee, Wis., announces its Type BT booster auto transformer in 75 and 150 kv-a. sizes, with conduit connections. These transformers are single and 3 phase, 60 cycle, and are designed for use on 3-phase, 4-wire network system, with 199 or 208 volts between phases. They are used for raising voltage of these network systems

in order to obtain proper operation of motors, rectifiers, heating units, magnets and other apparatus originally designed for 220 or 230-volt service. They are air-cooled and meet the requirements of the National Board of Underwriters. They are arranged for wall mounting and may be installed with terminals either on the top or on the bottom.

Audio Frequency Transformer

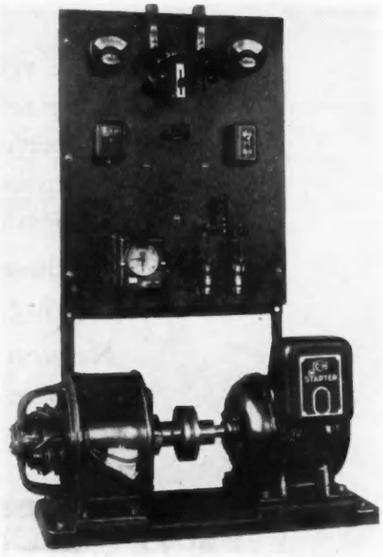
Hammerlund Mfg. Co., Inc., 424 W. 33rd St., New York, is marketing a Type AF-2 transformer for use in the first audio frequency stage. It has a ratio of one and one-half to one, while the ratio of the push-pull input transformer, AF-4, of similar design, is two to one on each side. The primaries of both transformers are very large. This coupled with the use of treated laminations grouped in a special manner into large cores permits uniform



amplification from as low as 46 to as high as 4800 cycles. All of these transformers are inclosed in enameled steel cases and have pigtail terminal leads for sub-base connections.

Battery Chargers

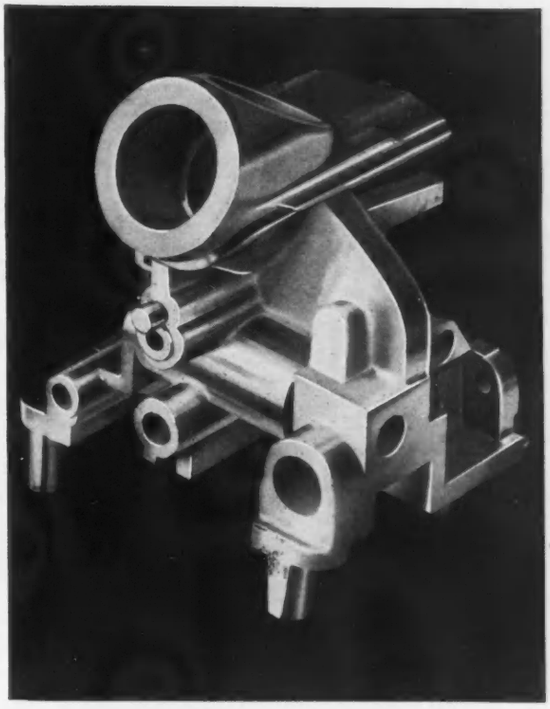
Engberg Division of the Troy Engine & Machine Co., St. Joseph, Mich., announces a battery charger that can be supplied either for manual or automatic operation to charge one or more lead or Edison batteries. The chargers consist of a standard Engberg motor generator set



with suitable characteristics for each particular installation. Both the motor and the generator have anti-friction bearings, and these two units are substantially mounted upon a cast-iron base plate and connected by means of a flexible coupling.

QUALITY ▾ PRICE DELIVERY ▾ ▾ ▾

Three die casting items for which STEWART has long been favorably known



MEN, Methods, Equipment—three reasons why Stewart is in a position to offer definite advantages in "price and delivery."

Stewart engineers and craftsmen have an unusually complete background of experience. They are specialists in die design and in the adaption of products to production as die-castings. These men work with automatic machinery, principally of Stewart design, in a plant that has always kept in step with the latest die-casting developments.

15,000 *of these frame castings delivered daily to one manufacturer bringing him definite economy*

It is this policy that enables Stewart to offer the utmost in service, quality and price.

A Stewart engineer will be glad to call and discuss your requirements with you, or we will submit definite information upon receipt of blueprints or samples of your present production.

Stewart

THE STEWART DIE CASTING CORPORATION

4500 Fullerton Parkway, Chicago, Illinois

Detroit • Pittsburg • Dayton • St. Louis
Newark • Cleveland

Index of Raw Materials, Parts, Electrical Equipment

For all electrical products including electrically operated machines and appliances

Trade Names—Manufacturers' Names—Local Addresses

The names of all manufacturers are grouped alphabetically under the heading for the product they manufacture. Trade names also appear in alphabetical position under the subject identifying the product. Thus "Linolac" insulating varnish will be found in alphabetical position under the heading "Paint, Varnish, Lacquer."

Note: The Classified Index of ELECTRICAL MANUFACTURING is limited to those subjects of interest to the specific field which it covers, for obvious reasons. A complete Classified Index of all electrical commodities bought, sold, or used by Electrical Supply Jobbers, Contractors, Dealers, Central Stations and other electrical industry outlets appears regularly in each issue of ELECTRICAL RECORD as heretofore.

ALLOYS, LIGHT METAL
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.

ALUMINUM
(Also Aluminum Bronze Powder.)
Albron, Alcoa, Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.

AMMETERS. See Instruments.

ARMATURE
Balancers. See Balancers, Armature.
Banding Machines. See Banding Machines, Armature
Bearings. See Bearings.
Buggies. See Lifts, Armature.
Coil Presses. See Presses, Armature Coil.
Coils. See Coils, Finished.
Core Punchings. See Discs, Armature.
Cranes. See Lifts, Armature.
Discs. See Discs, Armature.
Driers. See Ovens.
Growlers. See Testers, Coil.
Hoists. See Lifts, Armature.
Impregnators, Vacuum. See Ovens, Industrial.
Jacks. See Lifts, Armature.
Laminations. See Discs, Armature.
Lathes. See Lathes.
Lifts. See Lifts, Armature.
New. See Coils, Finished.
Notching Machines. See Notching Machines, Armature.
Pegs. See Pegs, Armature.
Pinion Pullers. See Pullers, Armature Shaft.
Repaired. See Repairing and Second-Hand.
Shaft Pullers. See Pullers, Armature Shaft.
Shaft Straighteners. See Straighteners, Armature Shaft.
Stands. See Stands, Armature.
Test Benches. See Test Benches, Armature.
Testers. See Testers, Coil; also Test Benches, Armature.
Torpedo Cord. See Twine, Armature Winding.
Trouble Shooters. See Testers, Coil; also Test Benches, Armature.
Trucks. See Lifts, Armature.
Wedges. See Pegs, Armature.
Winding Machines. See Winding Machines, Armature & Field Coil.
Winding Twine. See Twine, Armature.

ARMATURE & COIL SPRAY GUNS. See Spraying Outfits.

ARMORING MACHINES. See Wire Manufacturing Machines.

ARMS, FLEXIBLE. See Tubing Flexible Metallic.

ASBESTOS Shades, See Shades, Fabric.
Paper & Sheet. See Asbestos.
Slabs. See Asbestos Slabs.
Tape. See Tape, Asbestos.
Wire. See Wire, Insulated.
Yarn and Thread. See Yarn and Thread.

ASBESTOS
Sheet, Paper, Mill Board, Lumber.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Easco. See Eastern Asbestos Co.
Eastern Asbestos Co., Providence, R. I.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.

ASBESTOS SLABS
Slabs & Barriers for Switchboard.
Asbestos-Ebony. See Johns-Manville, Inc.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Decelco, Inc., Wayne, Mich.
Electrobestos. See Johns-Manville Corp.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Transite. See Johns-Manville, Inc.
Zellite. See Decelco, Inc.

BAGS, Vacuum Cleaner
Merrimack Mfg. Co., Boston, Mass.

BAKELITE MOULDS. See Dies, Die Makers.

BALANCERS, Armature
(Dynamic Balancing Machines—Balancing Ways).
Anderson Bros. Mfg. Co., Rockford, Ill. (Ways).
Armature Coil Equip. Co., 2415 Forestdale Ave., Cleveland, O. (Machine).
Bowsher Co., N. P., South Bend, Ind.
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa. (Machines).
Sundstrand Machine Tool Co., Rockford, Ill.
Twentieth Century. See Sundstrand Machine Tool Co.
Vibration Specialty Co., 1534 Winter, Philadelphia, Pa. (Machines).

BALL BEARINGS. See Bearings, Ball and Roller.

BANDING MACHINES, Armature
Columbia Machine Wks. & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridion Company, Frank, Boston, Mass.

BARRIERS, Switchboard. See Slate; also Soapstone; also Asbestos.

BARS, BUS. See Brass, Bronze & Copper; also Aluminum.

BARS, Commutator
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
Buckeye Tempered Copper & Brass Co., Mansfield, O.
Cameron Electric Mfg. Co., Ansonia, Conn.
Commutator Co., 121 N. Front, Minneapolis, Minn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Rome Brass & Copper Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.

BASES, Radio Tube. See Radio Molded Parts.

BASES, Reading Lamp
Metal, Pottery, Wood & Glass.
American Ring Co., Waterbury, Conn.
Aladdin Mfg. Co., Muncie, Ind.
Armor Bronze Co., Garwood, N. J.
Camden Art Tile & Pottery Co., Camden, Ark.
Estes & Sons, E. B., 5844 Grand Central Terminal, New
Fulper Pottery Co., Flemington, N. J.
Globe Metal Spinning Co., 178 Centre, New York, N. Y.
Hemill Products, Inc., 100 Mott, New York, N. Y.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Marblesart. See Insulation Mfg. Co.
Natural. See Insulation Mfg. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sneath Glass Co., Hartford City, Ind.
Van Briggle Tile & Pottery Co., Colorado Springs, Colo.
Weller, S. A., Zanesville, O. (Pottery.)
Tubal Corp., 219 Homestead Ave., Hartford, Conn.
Zane Pottery Co., South Zanesville, O.

BATTERY CHEMICALS. See Chemicals, Battery.
BATTERY CUT OUTS. See Switches, Battery.
BATTERY GAGES. See Instruments, Pocket.
BATTERY JARS. See Jars, Battery, Glass; also Rubber; also Molded Insulation.
BATTERY OXIDES. See Chemicals, Battery.
BATTERY SALTS. See Chemicals, Battery.
BEAD CHAIN. See Chain, Socket.
BEADS. Chandelier. See Crystals, Chandelier.

BEADS, Insulating
American Lava Corp., 1425 William, Chattanooga, Tenn.
Durvco. See Struthers Dunn, Inc.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

BEARINGS
Ball & Roller. See Bearings, Ball & Roller.
Graphite. See Bearings, Oil-less.
Oil-less. See Bearings, Oil-less.
Sleeve. See Bearings & Bushings.

BEARINGS, Ball and Roller
Aetna Ball Bearing Mfg. Co., 4600 Schubert Ave., Chicago, Ill.
Ahlberg Bearing Co., 312 E. 29th, Chicago, Ill.
Auburn Ball Bearings Co., 73 Clarissa, Rochester, N. Y.
Bantam Ball Bearing Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Commercial. See Schatz Mfg. Co.
C J B. See Ahlberg Bearing Co.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Poughkeepsie, N. Y.
Gurney. See Marlin-Rockwell Corp.
Hyatt Roller Bearing Co., Newark, N. J.
Hoffman. See Norma-Hoffman Bearings Corp.
McGill Metal Co., Valparaiso, Ind.
Marlin-Rockwell Corp., Jamestown, N. Y.
Mathews Mfg. Co., 164 Gold, Worcester, Mass.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co., (Nicetown), Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Whitehead Rd., Trenton.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Schubert. See McGill Metal Co.
Standard Steel & Bearings, Inc., Plainville, Conn.
Strom Bearings Co., 4587 Palmer, Chicago, Ill.
S. K. F. Industries, 40 E. 34th, New York, N. Y.
Timken Roller Bearing Co., Canton, O.
Torrington Co., Torrington, Conn.

BEARINGS, Oil-Less
Argute Oilless Bearings Co., 149 Berkeley, Philadelphia, Pa.
B. M. C. See Burlington Metal Corp.
Bogert & Hopper, Inc., 225 Varick, New York, N. Y.
Bound Brook Oil-less Bearing Co., Bound Brook, N. J.
Burlington Metal Corp., Burlington, Wis.
Cleveland Graphite Bronze Co., 880 E. 72nd, Cleveland, O
Electric Railway Equipment Co., 30 Church, New York, N. Y.
Elreco. See Electric Railway Equipment Co.
Graphalloy. See Graphite Metallizing Co.
Graphite Metallizing Co., Yonkers, N. Y.
Lubrite. See Merriam Bros., Yonkers, N. Y.
Merriam Bros., 185 Amory, Boston, Mass.
Metal Saw & Machine Co., Springfield, Mass.
Moraine Products Co., First & Foundry Sts., Dayton, O.
Neveroil Bearing Co., Wakefield, Mass.
Nolu Oilless Bearing Co., 6 E. Johnson, Philadelphia, Pa.
O. & S. Bearing Co., 315 S. Artillery, Detroit, Mich.
Reliance. See Metal Saw & Machine Co.
Selb Lignum-Vitae Woodturning Co., 98 Boyd Ave., Jersey City, N. J.
United States Graphite Bearing Co., Saginaw, Mich.

BEARINGS AND BUSHINGS
(For Armature Shafts.)
Adjustable Bearing Co., 101 Transportation Bldg., Indianapolis, Ind.
Ajax Metal Co., Philadelphia, Pa.
American Bronze Corp., Berwyn, Pa.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bunting Brass & Bronze Co., Toledo, Ohio.
Damascus Bronze Co., Pittsburgh, Pa.
Durex. See Moraine Products Co.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Flood City Mfg. Co., Johnstown, Pa.
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Moraine Products Co., First & Foundry Sts., Dayton, O.
National Bearing Metal Corp. (More-Jones Brass & Metal Div.), 4930 Manchester Ave., St. Louis, Mo.
United States Graphite Co., Saginaw, Mich.

BELTING, Chain Transmission. See Chain, Power Transmission.

BELTS, Rubber
Molded Cord Rubber Belts for Electrical Appliances.
Dayton Rubber Mfg. Co., Dayton, O.
Fay Rubber Products Co., Elyria, O
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.
Todd Drain-A-Tub Co., 1108 Walnut, Kansas City, Mo.

BENDERS, Coil Loop
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.

BENDING. See Punching & Bending.
BINDING POSTS. See Posts, Binding.

BLADES, Fan
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Spee-Dee Elec. Mfg. Co., 199 Lafayette, New York, N. Y
Torrington Mfg. Co., Torrington, Conn.

BLUESTONE. See Chemicals, Battery.
BOARD, Fuller. See Cloth and Paper.
BOARD, Press. See Cloth and Paper.
BOMBARDING MACHINES. See Machines, Lamp Making.
BOWL HOLDERS. See Fixture Fittings.
BOX & CABINET BUSHINGS. See Bushings, Box & Cabinet.

BOX BOARD
Container Corp. of America, 111 W. Washington, Chicago
Mid-West Box Co., 111 W. Washington, Chicago.

BOXES, Fibre
Container Corp. of America, 111 W. Washington, Chicago
Corrfibre. See Container Corp. of America.
Mid-West Box Co., 111 W. Washington, Chicago.
BOXES, Sheet Steel. See Cabinets, Sheet Steel.
BOXES, Wood. See Cabinets & Boxes, Wood.

BOXES AND WRAPPERS
Agar Mfg. Corp., Whippany, N. J.
Brown & Bailey Co., 417 N. Eighth, Philadelphia, Pa.
Bulldog. See Pittsburgh Corrugated Paper Box Co.
Campbell Paper Box Co., South Bend, Ind.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, 111 W. Washington, Chicago.
Gair Co., Robert, 420 Lexington Ave., New York. (Boxes.)
Gator-Hide Kraft. See International Paper Co.
Hinde & Dauch Paper Co., 325 Decatur, Sandusky, Ohio.
Huntington Paper Box Co., Huntington, Ind.
International Paper Co., 100 E. 42nd, New York, N. Y.
Lake Lithographing Co., 2570 Superior Ave., Cleveland, O (Display Cartons.)
Mid-West Box Co., 111 W. Washington, Dept. 36, Chicago.
National Folding Box Co., New Haven, Conn. (Cartons.)
Pequot Mfg. Corp., Glendale (L. I.), New York.
Pittsburgh Corrugated Paper Box Co., Pittsburgh, Pa.
River Raisin Paper Co., Monroe, Mich.
Rockford Fibre Container Co., Rockford, Ill.
Sefton Mfg. Co., 59 E. Madison, Chicago, Ill.
Shuttleworth Carton Co., 474 W. Broadway, New York.

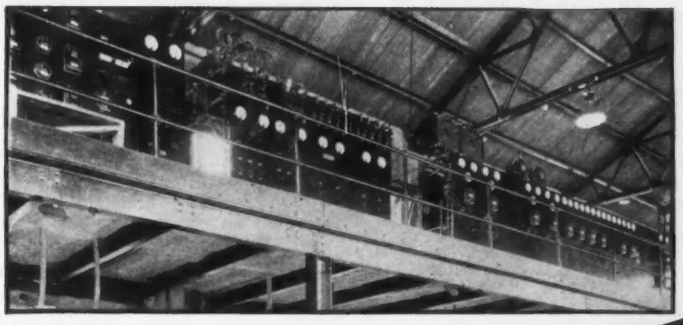
BRACKETS, Instrument
For Suspending Meters to Station Switchboard.
General Electric Co., Schenectady, N. Y.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

BRAIDING MACHINES. See Wire Manufacturing Machines.
BRASS TUBING. See Tubing, Brass and Copper.

BRASS, BRONZE AND COPPER
Sheet, Rod, Bar.
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ill.
Baltimore Brass Co., 1212 Wicomico, Baltimore, Md.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass Inc., 820 Orleans, Chicago, Ill.
Durbar. See Buffalo Bronze Die Cast Corp.
Electric Materials Co., North East, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts. Detroit
Higgins Brass & Mfg. Co., Div. of Revere Copper & Brass, Inc., 12435 Dequindre, Detroit, Mich
Johnson Bronze Co., New Castle, Pa.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, Inc., 5851 W. Jefferson Ave., Detroit, Mich.
Nickeloid. See American Nickeloid Co.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co. Seymour, Conn.
Taunton-New Bedford Copper Co., Div. of Revere Copper & Brass, Inc., Taunton, Mass.
Titan Metal Mfg. Co., Bellefonte, Pa. (Rods and Forgings.)
Western Cartridge Co., East Alton, Ill.

BREAKERS, Circuit. See Circuit Breakers.
BRIDGES, Wheatstone. See Instruments, Laboratory Standard.
BRONZE. See Brass, Bronze and Copper; also Castings.
BRONZE, Phosphor. See Phosphor Bronze.
BRONZE POWDER, Aluminum. See Aluminum.
BRUSH HOLDERS. See Brushes, Commutator.
BRUSHES, Carbon. See Brushes, Commutator.
Graphite. See Brushes, Commutator.
Metal Graphite. See Brushes, Commutator.

BRUSHES, COMMUTATOR
(Brushes, Brush Holders and Flexible Leads.)
Brush Holders ..... See H
Carbon, Graphite, Metal Graphite ..... See C
Flexible Leads and Pig Tails ..... See L
Sheet Metal ..... See S
Wire Gauze ..... See W
Automotive Mfg. Co., Kansas City, Mo. ..... H
B. B. B See Becker Bros. Elec'l Corp.



5 in 1

INSIDE AND OUT
FIVE USES IN ONE PLANT

AMBLER ASBESTOS PRODUCTS

IN THE PLANT OF VALLEY FORGE CEMENT CO., WEST CONSHOHOCKEN, PENNA.

1. Ambler Ebonized Asbestos Lumber for switchboard panels (top picture).
2. Ambler Asbestos Corrugated Sheets for roofing and siding of buildings (center picture).
3. Ambler Asbestos Shingles on roof of office building.
4. Ambler Asbestos Lumber on floor and fume hood of laboratory (lower picture).
5. Ambler Asbestos WALTILE as wainscoting in laboratory.

IN MANY places in and around your plant Ambler Asbestos Products may be used with real economy, fire safety, long life and attractive results. An inquiry on any of these products will be worth your while.

All products of

AMBLER ASBESTOS SHINGLE & SHEATHING COMPANY

Factories: **AMBLER, PA., and ST. LOUIS, MO.**

BRUSHES, Commutator—Continued
Baylis Co., Bloomfield, N. J. H
Becker Bros. Elec. Corp., 23 N. Jefferson, Chicago, Ill. C W S H L
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y. C
Bezill-Bruel Carbon Co., Columbia Park, O. C H
Calebaugh Self-Lubricating Carbon Co., 1503 Columbia Ave., Philadelphia, Pa. C
Carbon Engrg. Co., Slinger, Wis. C L
Carbon Laboratories Co., 5005 Euclid Ave., Cleveland, O. C
Carbon & Graphite Corp., 227 West Broadway, New York, N. Y. C
Carwico. See Carbon Engineering Co.
Chapin Co., Chas. E., 227 Fulton St., New York, N. Y. C W S L
Columbia Machine Wks. & M. I. Co., 263 Chestnut, Brooklyn, N. Y. H
Cooley Mfg. Co., 98 Park Place, New York W
Diamond C. See Chapin Co., Chas. E.
Dixon Crucible Co., Joseph, Jersey City
Electra. See Automotive Mfg. Co.
Electric Accessories Co., 310 York Ave., Philadelphia, Pa. H
Electro-Nite Carbon Co., 308 N. Fourth, Philadelphia, Pa. C
Eureka Metal Products Corp., 91 Clay, North East, Pa. W S H
Fleck Carbon Co., 508 Broome, New York C
General Electric Co., Schenectady, N. Y. C H
Graphalloy. See Graphite Metallizing Corp.
Graphite Metallizing Corp., 1040 Nepperhan Ave., Yonkers, N. Y. C H
Henrite Products Co., 98 Park Place, New York, N. Y. C
Holland Trolley Supply Co., 1623 E. 43rd, Cleveland, Ohio H
Jeandron, W. J., 345 Madison Ave., New York, N. Y. (Imported.) C
Keystone Carbon Co., 4630 N. 11th, Philadelphia, Pa. C
Kohlenite Products Co., 92-34 152nd St., Jamaica, N. Y. C
Le Carbone. See Jeandron, W. J.
Le Valley Vitae Carbon Brush Co., 4851 Grand Central Terminal, New York, N. Y. C
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich. C
Morganite Brush Co., 33-02 48th Ave., Long Island City, N. Y. C
National Carbon Co., Cleveland, O. C
New Process Carbon Co., 1503 Columbia Ave., Philadelphia, Pa. C L
No Spark. See Calebaugh Self-Lubricating.
Ohio Carbon Co., 8215 Almira Ave., Cleveland, Ohio C W L
Ohio Elec. Specialty Mfg. Co., Troy, O. W
Perfection Supply Co., 98 Park Pl., New York, N. Y. C W S H L
Pittsburgh Carbon Brush Co., 127 Fancourt, Pittsburgh, Pa. C
Pure Carbon Co., Wellsville, N. Y. C W S L
Pyramid. See National Carbon Co.
Reaction. See Baylis Co.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y. W L
Salem Electrical Supply Co., Salem, Mass. W
Sharr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo. C
Spee-Dee Elec. Mfg. Co., 199 Lafayette, New York, N. Y. C L
Speer Carbon Co., St. Mary's, Pa. C
Stackpole Carbon Co., St. Mary's, Pa. C
Sterling. See Carbon Laboratories Co.
Superior Carbon Products Co., North Rd., Poughkeepsie, N. Y. C
U. S. Graphite Co., Saginaw, Mich. C
Universal. See Graphite Metallizing Corp.
Weber Elec. Wks., Brooklyn Sta., Cleveland. C L
BRUSHES, PNEUMATIC SPRAYING. See Spraying Outfits.

BRUSHES FOR VACUUM CLEANERS
Omaha Brush Co., 320 N. 15th, Omaha, Neb. (Brushes rebristled.)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

BUGGIES, Armature. See Lifts, Armature.

BULBS, Glass
For Incandescent Lamps and Tubes.
Almo Mfg. Co., 38 Crawford, Newark, N. J.
Corning Glass Wks., Corning, N. Y.
Fayette Glass Bulb Co., 229 21st, Brooklyn, N. Y.
Libby Glass Co., Toledo, O.

BUNCHING MACHINES. See Wire Manufacturing Machines.

BUS BAR. See Brass, Bronze and Copper. Also Aluminum

BUSHINGS, SHAFT. See Bearings and Bushings.

BUSHINGS, Box and Cabinet, Porcelain
Appleton Electric Co., 1704 Wellington Ave., Chicago, Ill
Columbia Metal Box Co., 226 E. 144th St., New York, N. Y.
Harter. See Multi Elect. Mfg. Co.
Knox Porcelain Corp., Knoxville, Tenn.
Mineralac Electric Co., 25 N. Peoria, Chicago, Ill.
Multi Electric Mfg. Co., 210 N. Ogden Ave., Chicago, Ill.
Nelson Elec. Co., Plant City, Fla.

CABINET GRILL CLOTH. See Cloth, Untreated.

CABINETS, Fibre
Continental-Diamond Fibre Co., Bridgeport, Pa.
Vulcawood. See Continental-Diamond Fibre Co.

CABINETS, Refrigerator. See Refrigerator Cabinets.

CABINETS, Sheet Steel
Stamped and Turned-up Boxes and Cabinets.
Acme Blow Pipe & Sheet Metal Wks., New Orleans, La.
Adam Electric Co., Frank, St. Louis, Mo.

All-Steel-Equip. Co., Aurora, Ill.
American Metal Wks., 4565 Stanton Ave., Philadelphia, Pa.
American Steel Furniture Co., 27 W. 24th, New York, N. Y.
Aurora Steel Products Co., Aurora, Ill.
Benjamin Elec. Co., 1378 E. 10th, Los Angeles, Cal.
Berks Engineering Co., Reading, Pa.
Berthold Elec. Co., Gus, 551 W. Monroe, Chicago, Ill.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Chicago Hdwe. Foundry Co., North Chicago, Ill.
C. & P. Electric Wks., Springfield, Mass.
Cleveland Switchboard Co., 2925 E. 79th, Cleveland, O.
Coast Specialty Co., 73 E. Sixth, Portland, Ore.
Cole Electric Products Co., 33 Crescent, Long Island City.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Elec. Mfg. Co., 59 Columbus Sq., San Francisco, Cal.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Columbian Steel Tank Co., 1505 W. 13th, Kansas City, Mo.
Commercial Mfg. & Supply Co., 1443 Delaware St., Denver.
Creiger Electrical Mfg. Co., 609 W. Lake, Chicago, Ill.
Diamond Elec'l Mfg. Co., 1230 E. 16th, Los Angeles, Cal.
Dowman-Dozier Mfg. Co., 1314 Murphy Ave., S. W., Atlanta, Ga.
Electric Apparatus Co., 704 N. Halsted, Chicago, Ill.
Electric Panelboard Co., 426 Exchange, Rochester, N. Y.
Federal Steel Products Co., 2 Ave. L, Newark, N. J. (Polarized Boxes.)
Fouch Elec. Mfg. Co., 105 N. Ninth, Portland, Ore.
Greater New York Metal Box Co., Inc., 143 W. 19th, New York.
Green Elec. Co., 31 N. Water, Rochester, N. Y.
Gurney Sheet Metal Wks., 718 E. 4th, Long Beach, Cal.
Hauer, J. B., Driggs Ave. and N. 11th, Brooklyn, N. Y.
Holzer Sheet Metal Wks., Inc., New Orleans, La.
Hough Mfg. Co., 2520 24th, Detroit, Mich.
Isert Co., J. H., 1234 Rowan, Louisville, Ky.
Karp Metal Products Co., 129 30th, Brooklyn, N. Y.
Kirtland Elec. Construction Co., 34 Herkimer, Albany, N. Y.
Large-Dail Mfg. Co., 406 Cherry St., Philadelphia.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O.
Lexington Elec. Products Co., 419 E. 24th, New York, N. Y.
Lorentzen, H. K., 155 Leonard, New York, N. Y.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Mansfield Elec. Hardware Co., Longview Ave., Mansfield, O.
Metropolitan Elec. Co., 2914 First Ave., S., Seattle, Wash.
Metropolitan Elec. Products Co., Blvd. at 14th, Long Island City, N. Y.
Milwaukee Vault & Cabinet Co., 521 Market, Milwaukee.
Mosher, S. L., 1951 Lawrence, Denver, Colo.
National Metal Box Co., Van Dyke & Ferris Sts., Brooklyn.
Newman Elec. & Mfg. Co., Eau Claire, Wis.
Par-Metal Products Corp., 3519 41st, Long Island City, N. Y.
Penn Electrical Co., 35 Water, Irwin, Pa.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Rezioh. See Holzer Sheet Metal Works.
Robbins & Myers, Inc., Springfield, O.
Security. See Aurora Steel Products Co.
Standard Metal Box Corp., 950 Grand St., Brooklyn, N. Y.
Star Metal Box Co., 238 46th, Brooklyn, N. Y.
Superior Switchboard & Devices Co., 420 Schroyer Ave., Canton, O.
Tanner & Co., Wm. F., 511 S. Sharp, Baltimore, Md.
United Metal Box Co., 473 President, Brooklyn, N. Y.
United Sheet Metal Wks., 575 Howard, San Francisco.
Universal Metal Box & Products Co., 316 Coit, Irvington, N. J.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Wiegman & Co., E. M., 1908 Benton, St. Louis, Mo.
Wurdack Elec. Mfg. Co., 4444 Clayton Ave., St. Louis, Mo.

CABINETS AND BOXES, Wood
Accurate Molding Corp., 20 Morton, Brooklyn, N. Y.
Adler Mfg. Co., Louisville, Ky.
Adler Royal. See Adler Mfg. Co.
Ampere. See Donehue Lumber Co.
Art Woodworking Co., Inc., 1035 Seattle Blvd., Seattle, Wash.
Aston Cabinet Mfrs., 1223 W. Lake, Chicago, Ill.
Blackhawk Furniture Co., Rockford, Ill.
Boehm Cabinet Co., J., 2216 W. 63rd St., Cleveland, O.
Carlon. See Art Woodworking Co.
Carolina Wood Products Co., Asheville, N. C.
Carrom Co., Ludington, Mich.
Caswell-Runyon Co., Huntington, Ind.
Cary Cabinet Corp., 1427 N. 15th, St. Louis Mo.
Cheney Piano Action Co., A. C., Castleton, N. Y.
Chickasaw Furniture Mfg. Co., Memphis, Tenn.
Conrades Mfg. Co., 1942 N. Second, St. Louis, Mo.
Conner Furniture Co., New Albany, Ind.
Continental Radio Corp., East Pontiac, Extended, Fort Wayne, Ind.
Corbett Cabinet Mfg. Co., St. Mary's, Pa.
Cory Cabinet Corp., Springfield, Mo.
Decker Co., Geo., Henderson, Ky.
Ebert Furniture Co., 225 W. 34th, New York, N. Y.
Efkin & Sons, Frederick, 44 Central Ave., Brooklyn, N. Y.
Empire-United Hat Block Co., 312 E. 22nd, New York.
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Excel Phonograph Mfg. Co., 400 W. Erie, Chicago, Ill.
Excello Products Corp., 4836 W. 16th, Cicero, Ill.
Federal Wood Products Corp., 206 Lexington Ave., New York, N. Y.
Findlay Mfg. Co., Metropolitan & Morgan Aves., Brooklyn.
Grand Rapids Furniture Co., Grand Rapids, Mich.
Harper Mfg. Co., Cassopolis, Mich.
Hickory Box Co., Hickory, N. C.
Hubbell, H. L., 59 Market Ave., N. W., Grand Rapids.
Interstate Woodworking Co., 46 Wooster, New York, N. Y.
Karpen. See Stwinner Bros.
Kiel Furniture Co., 32nd and Center Sts., Milwaukee, Wis. (Radio Table)
King Mfg. Corp., 254 Rano, Buffalo, N. Y.
Klumpp Sons, John G., 13 Baxter, New York, N. Y.
Knoxville Table & Chair Co., Knoxville, Tenn.
National Cabinet Co., New Philadelphia, O.
New England Box Co., Greenfield, Mass.
Ohio Valley Cabinet Co., Wheeling (Warwood), W. Va.
Oneida Cabinet Corp., Oneida, N. Y.
Ottawa Furniture Co., Holland, Mich.
Phono-End-Table. See Continental Radio Corp.
Pooley Co., 16th & Indiana Ave., Philadelphia, Pa.
Radio Allied Mfrs. Corp., 1340 S. Michigan Ave., Chicago.

Radio Cabinet Mfg. Corp., Furniture Mart, Chicago, Ill.
Radio Cabinet & Equipment Co., 1504 Vine, Philadelphia.
Radio Mfg. Co., Div. of Pillied Lumber Co., Swanton, O.
Radio Master Corp., Bay City, Mich.
Red Lion Cabinet Co., Red Lion, Pa.
R E. Z. Cabinet Co., 54 North, Boston, Mass.
Schutz Bros., 152 Chambers, New York, N. Y.
Showers Bros. Co., Bloomington, Ind.
Signal Elec. Mfg. Co., Menominee, Mich.
Southern Toy Co., Hickory, N. C.
Specialty Display Case Co., Kendallville, Ind.
Starr Piano Co., Richmond, Ind.
Steitner Phonograph Corp., 669 Kent Ave., Brooklyn, N. Y.
Studner Bros., 67 W. 44th, New York, N. Y.
Superior Cabinet Corp., 206 Broadway, New York, N. Y.
Syracuse Screen & Grille Co., North Manchester, Ind.
Tessier Bros., 355 Bridge, Northampton, Mass. (Radio.)
Trenton Wood Specialty Co., Stokes Ave. and P. R. R., Trenton, N. J.
Udell Wks., 28th and Barnes Ave., Indianapolis, Ind
United Reproducers Corp., 25 Leighton Ave., Rochester, N. Y.
West Box Co., 235 Liberty, Springfield, Mass
Wood Cabinet Corp., 196 Lexington Ave., New York,, N. Y.

CABLE ARMORING MACHINES. See Wire Manufacturing Machines

CABLE TEST SETS. See Instruments, Portable and Switchboard.

CABLING MACHINES. See Wire Manufacturing Machines.

CANDLES, Fixture
Glass, Fibre Paper.
Brandywine Fibre Products Co., 1402 Walnut, Wilmington.
Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Fibro Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., 173 Lafayette, New York, N.Y.
Phoenix Glass Co., Monaca, Pa.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Seamless. See Fibro Products Co.

CANOPY (Canopies). See Fixture Fittings.
Insulators. See Insulators.
Switches. See Switches, Snap.

CAPACITORS, RADIO. See Radio Circuit Components.

CARBON, Powdered
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.

CARBONS, Battery. See Carbons.
Arc Light. See Carbons.

CARBONS
Battery Arc Light.
Becker Bros. Elecl. Corp., 23 N. Jefferson, Chicago, Ill.
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y.
Columbia. See National Carbon Co.
Daylight. See National Carbon Co.
Lessing Battery. See Blanck & Carrier Corp.
Nuernberg Battery. See Blanck & Carrier Corp.
National Carbon Co., Cleveland, Ohio.
Oretip. See National Carbon Co.
Silvertip. See National Carbon Co.
Speer Carbon Co., St. Mary's, Pa.
Stackpole Carbon Co., St. Mary's, Pa.

CARTONS. See Boxes and Wrappers.

CASEIN PLASTICS. See Molded Insulation.

CASES, Eliminator. See Cases, Eliminator.
Flashlight. See Cases, Flashlight.

CASES, Eliminator
Brumberger Co., 252 Pearl, New York, N. Y.
Grand Sheet Metal Wks., 176 Grand, New York, N. Y.
Karp Metal Products Co., 129 30th, Brooklyn.

CASES, Flashlight
Bridgeport Brass Co., 744 E. Main, Bridgeport, Conn.
Lincoln Fibre Specialty Co., Newport, Del.
St. Louis Paper Can & Tube Co., St. Louis, Mo.
Underwood Battery Co., 1250 Ontario, Cleveland, O.

CASTINGS, Aluminum. See Castings, Aluminum. Also Castings, Copper, etc.
Brass. See Castings.
Bronze. See Castings.
Copper. See Castings.
Die. See Castings, Die.
Monel Metal. See Castings.
Steel. See Castings, Steel.
White Metal. See Castings.

CASTINGS, Aluminum
Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh.
Bergen Point Brass Foundry, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohm Aluminum & Brass Corp., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Monarch Aluminum Ware Co., 9301 Detroit Ave., Cleveland.
National Bronze & Aluminum Foundry Co., 88th & Lake, Cleveland O.
Quality Aluminum Casting Co., Waukesha, Wis
Tenual. See National Bronze & Aluminum Foundry Co
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.
Veco Mfg. Co., South Norwalk, Conn.

CASTINGS
Copper, Brass, Bronze, Monel Metal, White Metal.
Anderson Mfg. Co., Albert & J. M., 289 A Boston Mass
Barnard Foundry Co., 9 Roseland, Springfield, Mass.
Bergen Point Brass Foundry, Bayonne, N. J
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., Detroit.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Central Pattern & Foundry Co., 3737 S. Sacramento Ave., Chicago, Ill.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Davis & Zuckerman, 514 E. 11th, New York, N. Y.
Delta Star Electric Co., 2437 Fulton, Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Faries Mfg. Co. Decatur, Ill.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit.
Harsch, John, Bronze & Foundry Co., 11612 Madison Ave., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.

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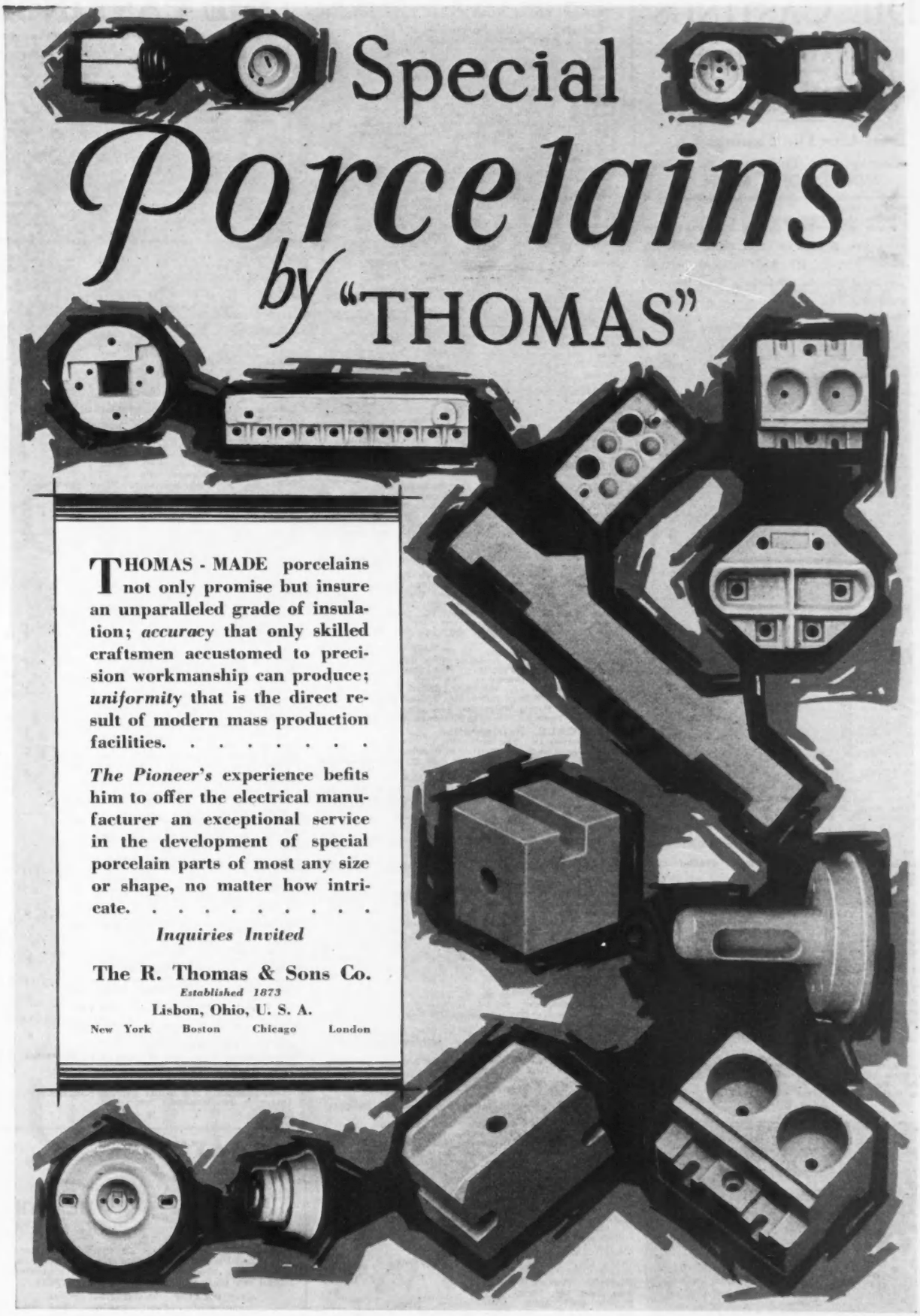

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National Bronze & Aluminum Foundry Co., 88th & Lazy, Cleveland, O.
Ohio Pattern Wks. & Fdy. Co., 2730 Spring Grove Ave., Cincinnati, O
Ohio Bronze Foundry, 617 West Belgrave, Huntington Park, Cal.
Sterling Art Metal Wks., 40 Purvis, Long Island City, N. Y.
Tenaul. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn

CASTINGS, Die

Advance Tool & Die Casting Co., 1654 Holton, Milwaukee.
Alemite Die-Casting & Mfg. Co., Woodstock, Ill.
Allied Die-Casting Corp., Long Island City, N. Y.
Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh.
Aluminum Industries, Inc., 2438 Beekman, Cincinnati, O.
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
American Die Casting Co., 2040 Dominick, Chicago, Ill
Badger Die Casting Co., 155 Buffalo, Milwaukee, Wis.
Barnhardt Bros. & Spindler, Monroe & Throop St., Chicago.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Do-Di. See Doehler Die Casting Co.
Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Franklin Die Casting Corp., 826 Gifford, Syracuse, N. Y.
Illinois Die Castings Co., 551 W. Congress, Chicago, Ill.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Milwaukee Die Casting Co., 293 Fourth, Milwaukee, Wis.
Newton Die Casting Corp., 146 Munson, New Haven Conn.
Paragon Die Casting Co., 2701 N. Crawford Ave., Chicago.
Perfection Die Casting Corp., 406 Lakeside Ave., N. W., Cleveland, O.
Permite. See Aluminum Industries, Inc.
Phoenix Die Castings Co., 21 Illinois, Buffalo, N. Y.
Pittsburgh Die Casting Co., 7508 Ardmore, Swissvale, Pa.
Stewart Die Casting Co., 4500 Fullerton Ave., Chicago, Ill.
Superior Die Casting Co., 875 E. 70th, Cleveland, Ohio.
Twin City Die Castings Co., Talmadge and 33rd Aves., S. E., Minneapolis, Minn. (White Metal).

CASTINGS, Gray Iron

American Engineering Co., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Barlow Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.
Barnett Foundry Co., Newark, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Eastern Malleable Iron Co., Naugatuck, Conn.
Fairmount Foundry, Inc., Third & Westmoreland Sts., Philadelphia, Pa.
Forest City-Walworth Run Fuondries Co., 2500 W. 27th, Cleveland, O.
Gray Iron Foundry Co., Reading, Pa.
Milwaukee Grey Iron Foundry Co., 3910 Mitchell, Milwaukee, Wis.
North Lebanon Foundry Co., Second & Canal, Lebanon, Pa.
North Wales Mach. Foundry Co., North Wales, Pa.
Products Machine Co., Bridgeport, Conn.
Sacks Iron Foundry, L., 357 Wilson Ave., Newark, N. J.
Snead & Co. Pine St., Jersey City, N. J.
Southern Malleable Iron Co., 21st St. and Bond Ave., East St. Louis, Ill.
St. Louis Malleable Castings Co., 7701 N. Conduit Ave., St. Louis, Mo.
Union Mfg. Co., New Britain, Conn.
Western Foundry Co., Kedzie Ave. at 36th, Chicago, Ill.

CASTINGS, Steel

Bonney-Floyd Co., Columbus, Ohio.
Eastern Steel Casting Co., Ave. L & Edward St., Newark
Northwestern Steel & Iron Corp., 2907 Fourth, S. E., Minneapolis, Minn.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Precian. See Northwestern Steel & Iron Corp.
Riverside Steel Casting Co., Jacobus Ave., Kearney, N. J

CEMENT, Commutator

Anchorlute. See Technical Products Co.
Commutator Companion. See Withington Div. of Marnot Co.
Conductalute. See Technical Products Co.
Early, Edward E., 1129 W. Fifth, N. W., Canton, O.
Fixkwick. See Technical Products Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Mitchell Rand Mfg. Co., 19 Vesey, New York, N. Y.
Perce-Lute. See Perfection Supply Co.
Perfection Supply Co., 98 Park Pl., New York, N. Y.

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Technical Products Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Withington Div. of Marnot Co., 50 Thayer, Boston, Mass.

CEMENT, Liquid Porcelain

Anchorlute. See Technical Products Co.
Fire Lute. See Technical Products Co.
Insa-Lute. See Technical Products Co.
Okonite Co., Passaic, N. J.
Patch-O-Namel. See Technical Products Co.
Repairet Mfg. Co., Milwaukee, Wis.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Technical Products Co., Pittsburgh, Pa.
Thermold. See Technical Products Co.
CHAIN, Chandelier (Fancy). See Crystals, Chandelier.
CHAIN DRIVES. See Chain, Power Transmission.

CHAIN, Fixture

Acco. See American Chain Co.
American Chain Co., Bridgeport, Conn.
Chase Brass & Copper Co.
Eastern Chain Works, 309 E. 22nd St., New York, N. Y
Farles Mfg. Co., Decatur, Ill.
Globe Metal Mfg. Co., 2122 E. Hazard, Philadelphia, Pa
H. & O. Chain Co., So. Norwalk, Conn.
Newark Metal Mfg. Co., 22 S. 6th, Newark, N. J.
Plume & Atwood Mfg. Co., Waterbury, Conn.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Steele & Johnson Mfg. Co., Waterbury, Conn.
Universal Metal Chain Co., 75 Clymer, Brooklyn, N. Y

CHAIN, Power Transmission

Baldwin Chain & Mfg. Co., Worcester, Mass.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind
Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Reeves Pulley Co., Columbus, Ind.
Renold Boston. See Boston Gear Wks.
Union Chain & Mfg. Co., Sandusky, O.
Whitney Mfg. Co., Hartford, Conn.

CHAIN, Socket

American Ball Chain Works, 12 Wooster St., New York.
Bead Chain Mfg. Co., Bridgeport, Conn.
H. & O. Chain Co., South Norwalk, Conn.
CHANDELIER BEADS. See Crystals, Chandelier.
CHANDELIER CRYSTALS. See Crystals, Chandelier.
CHANDELIER FRINGE. See Crystals, Chandelier.

CHARGERS, Magnet

Charging, Remagnetizing.
Colvin Corp., 6110 S. Main, Los Angeles, Cal.
Cowie Elec. Co., E. S., 1823 Wyandotte, Kansas City, Mo
Fore Elec. Mfg. Co., 5955 Wabada Ave., St. Louis, Mo.
Scintilla Magneto Co., Inc., Sidney, N. Y.
Serwell Sales Corp., 1749 N. Winchester Ave., Chicago
Valley Electric Co., 4221 Forest Park Blvd., St. Louis, Mo.

CHEMICALS, Battery

Electrolyte, Battery Salts, Battery Oxides, Sal Ammoniac, Bluestone, Manganese.
Cooper & Co., Charles, 194 Worth, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago. (Oxide.)
Elmer & Amend, 205 3rd Ave., New York, N. Y.
Electrex. See Goodyear Chemical Co., Inc.
Electro Chemical Co., 113 W. Court St., Dayton, O.
General Metallic Oxides Co., Jersey City, N. J.
Globe Chemical Co., Murray Rd. and Big Four R. R., Cincinnati, O.
Goodyear Chemical Co., Inc., 20 W. 22nd, New York, N. Y.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O
Kalbfleisch Corp., 200 5th Ave., New York, N. Y.
Klipstein Co., 644 Greenwich, New York, N. Y.
Merrimac Chemical Co., 148 State, Boston, Mass.
Powers-Weighman-Rosengarten Co., Philadelphia, Pa.
Voltah. See Powers-Weighman-Rosengarten Co.
Wah Chang Trading Corp., 233 Broadway, New York, N. Y.

CHEMICALS, Refrigeration

Angul Chemical Co., Marinette, Wis.
Arctic. See Roessler & Hasslacher Chemical Co.
Carbide & Carbon Chemicals Corp., 30 E. 42nd, New York, N. Y. (Butane & Isobutane.)
Dry Ice Corp. of America, 50 E. 42nd, New York, N. Y.
Roessler & Hasslacher Chemical Co., 709 Sixth Ave., New York, N. Y. (Methyl Chloride, Ethyl Chloride.)
Virginia Smelting Co., West Norfolk, Va. (Sulphur Dioxide.)
Chromium Plating. See Plating & Finishing.

CHUCKS, Magnetic

J & H Elec. Co., 200 Richmond, Providence, R. I.
Simmons. See Taft-Pierce Mfg. Co.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S. (Rockdale), Worcester, Mass.

CIRCUIT BREAKERS

Air and Oil Circuit Breakers and Oil Break Switches
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson Mfg Co. Albert & J. M., 289 A, Boston, Mass.
Anderson & Co., C. J., 212 W. Austin Blvd., Chicago, Ill.
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Automatic Switch Co., 517 E. Larned, Detroit, Mich.
Burke Controller Co., 349 Lexington Ave., New York, N. Y
Cendit Elec'l Mfg. Corp., 838 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee. (Mercury Type).
Domestic Elec. Co., 7723 St. Clair Ave., Cleveland, O.
General Electric Co., Section W-234, Bridgeport, Conn.
Hart & Hegeman Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hartman Electrical Mfg. Co., 31 E. Fifth, Mansfield, Ohio.
High Tension Elecl. Specialty Co., 500 Washington, Abington, Mass.
Hitesco. See High Tension Elecl. Specialty Co
H. & H. See Hart & Hegeman Div.
Inducto-therm. See Allen-Bradley Co
I. T. E. Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.
Line Material Co., South Milwaukee, Wis. (Oil Switches.
Maple Co., R. H., Indianapolis, Ind.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Minibraker. See Burke Controller Co.
Soller-Smith Co., 239 Broadway, New York, N. Y.
Sentinel. See Westinghouse Elec. & Mfg. Co.
Takamine Corp., 909 Rawson, Long Island City, N. Y
Time-O-Stat Controls Co., Cramblett Engineering Div. 286, Milwaukee Ave., Milwaukee, Wis.
U-Re-Lite. See I. T. E. Circuit Breaker Co
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
CIRCUIT TESTERS. See Testers, Fuse and Circuit
CLEANER BAGS, Vacuum. See Bags, Vacuum Cleaner
CLEANER BRUSHES, Vacuum. See Brushes for Vacuum Cleaners.

CLEANERS, Metal

Oakite Products, Inc., 26 Thames, New York, N. Y.
CLIPS, Fuse. See Fuse Clips.

CLIPS, Heater Plug

Gray Bros. Co., Plano, Ill.
CLOCK SWITCHES. See Switches, Time.
CLOTH GEARS. See Gears and Pinions, Composition.
CLOTH LOUD SPEAKER DIAPHRAGM. See Cloth, Untreated
CLOTH RADIO GRILL. See Cloth, Untreated.

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CLOTH, Untreated

Boyle & Co., John, 112 Duane, New York, N. Y.
Canvas, "Aeroplane Cloth," Cotton Duck, Drill, Diaphragm Cloth, Grill Fabrics, etc
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pindall Fabrics Corp., 200 Madison Ave., New York, N. Y. (Grill Cloth).

CLOTH AND PAPER, Insulating

Cloth, Insulated ..... See C
Paper, Insulated ..... See P
Fibre Paper (Fish Paper) ..... See F
Press Board (Fuller Board) .... See B
Silk ..... See S

Azme Wire Co., New Haven, Conn.	C	S	P		
Armco. See Rogers Paper Mfg. Co.					
Armatite. See Mica Insulator Co.					
Behr-Manning Corp., Troy, N. Y.			P		
Brand & Co., William, 268 4th Ave., New York			P		
Campbellite. See National Vulcanized Fibre Co.					
Carboloid Products Corp., 15 Park Row, New York, N. Y.	C		P		
Case Brothers, Inc., Highland, Park, Conn.			P		B
Case Mfg. Co., Unionville, Conn.			P		
Case & Risley Press Paper Co., Oneco, Conn.					
Celoron Co., Bridgeport Pa.			P	F	B
C-F. See National Vulcanized Fibre Co.					
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.	C				
Columbian Rope Co., Auburn, N. Y.			P		
Continental-Diamond Fibre Co., Bridgeport, Pa.			P		
De Jonge & Co., Louis, 69 Duane, New York, N. Y. (Condenser)			P		
Dexstar. See Dexter & Sons.					
Dexter & Sons, C. H., Windsor Locks, Conn. (Condenser Tissue.)					
Dielectric Mfg. Co., St. Louis, Mo.	C	S	P		B
Electrite. See West Virginia Pulp & Paper Co.					
Feberoid. See Wilmington Fibre Specialty Co.					
General Electric Co., Merchandise Dept., Bridgeport, Conn.	C		P		
chandise Dept., Bridgeport, Conn.	C		P		
Hartford City Paper Co., Hartford City, Ind. (Glassine Condenser Tissue).					
Hewitt & Bros., C. B., 16 Ferry, New York	C		P		
Hi-Tex See Stevens Paper Mills.					
Hollingsworth & Vose Co., 333 Washington, Boston, Mass.			P		
Insocite. See Tarentum Paper Mills Co.					
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.			P		
Irvington Varnish & Insulator Co., Irvington, N. J.	C	S	P		
Manning Paper Co., J. A., Troy, N. Y.					B
Mica Insulator Co., 200 Varick, New York	C	S	P		B
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.			P		
National Vulcanized Fibre Co., Wilmington, Del.				F	
New Jersey Wood Finishing Co., Woodbridge, N. J.	C				
Ohmold. See Wilmington Fibre Specialty Co.					
Old Hick. See Hewitt & Bros., C. B.					
Peerless. See National Vulcanized Fibre Co.					
Riegels. See Warren Mfg. Co.					
Rogers Fibre Co., 319 Lincoln, Boston, Mass.				F	
Rogers Paper Mfg. Co., So. Manchester Conn.					B
Schweitzer, Inc., Peter J., 299 Fifth Ave., New York, N. Y. (Condenser Tissue.)					
Sico. See Standard Insulation Co.					
Standard Insulation Co., East Rutherford, N. J.	C	S	P		
Sterling Fireboard Co., 501 Fifth Ave., New York. (Varised Hard Fibreboard)					B
Sterlite. See Sterling Firebrand Co.					
Stevens Paper Mills, Windsor, Conn.					B
Tarentum Paper Mills Co., Tarentum, Pa.			P		
Turbonite. See Brand & Co., Wm.					
Union Mills Paper Mfg. Co., New Hope, Pa.			P		
Warren Mfg. Co., 342 Madison Ave., New York, N. Y.			P		
West Virginia Pulp & Paper Co., 230 Park Ave., New York					B
Wilmington Fibre Specialty Co., Wilmington, Del.			P		

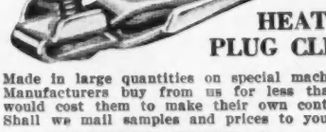
CLUTCHES, Magnetic

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis

COIL (Coils).

Armature and Field. See Coils, Finished.
Choke (Radio). See Radio Circuit Components.
Driers & Impregnators. See Ovens.

"GRAY"



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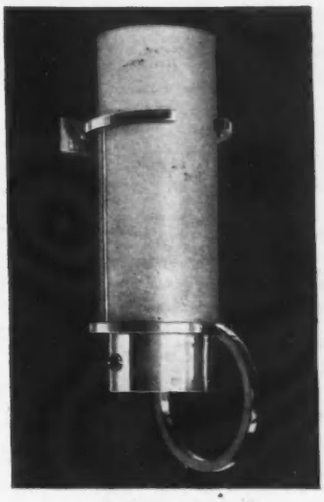

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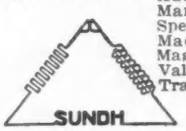
Transfer Switches



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High Frequency. See Electro-Therapeutic; also Radio Circuit Components; also Ignition Outfits.
Impregnators, Vacuum. See Ovens, Industrial.
Induction. See Coils, Finished; also Electro-Therapeutic
Loop Benders. See Benders, Coil Loop.
Medical. See Electro-Therapeutic.
Presses. See Presses, Armature Coil.
Radio. See Radio Circuit Components.
Removers. See Removers, Coil.
Resistance. See Units, Rods & Grids; also Radio Circuit Components.
Shaping Machines. See Shaping Machines, Coil
Spark. See Ignition Outfits.
Spreaders. See Winding Machines, Armature and Field.
Tamping Tools. See Tools, Coil Tamping.
Taping Machines. See Taping Machines, Coil
Testers. See Testers, Coil; also Test Benches, Armature
Winders, Armature & Field Coil. See Winding Machines Armature & Field Coil.
Winders, Induction Coil. See Winding Machines, Industrial Coil.
Winding Forms. See Forms, Coil Winding
Windings (Magneto). See Coils, Finished.
Wire Tension Devices. See Tension Devices, Coil Wire

COILS, Finished

Armature, Field, Electromagnet and Induction Coils
Acme Products Co., Boston, Mass.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Arma Wire Co., New Haven, Conn.
Aero-Coil. See Aero Products, Inc.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Auth Electrical Specialty Co., 422 E. 53rd St., New York
A. & A. See Electrical Coil Winding Co.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill
Bunnell & Co., J. H., 32 Park Place, New York, N. Y.
Burke Controller Co., 349 Lexington Ave., New York, N. Y.
Cameron Elec. Mfg. Co., Ansonia, Conn.
Coto Coil Div. of Universal Winding Co., Providence, R. I.
Ditmar Elec. Co., Brookline, Mass.
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne
Easton Coil Co., Easton, Pa.
Electric Heat Control Co., 8902 Carnegie Ave., Cleveland, O.
Electric Valve Mfg. Co., 68 Murray, New York, N. Y.
Electrical Coil Winding Co., 2735 Saunders, Camden.
Electrical Products Mfg. Co., Providence, R. I.
Fredericks Co., H. M., Lock Haven, Pa.
Globe Technolian Corp., Reading, Mass.
Herald Electric Co., 29 East End Ave., New York, N. Y.
Inca Mfg. Co., Fort Wayne, Ind.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
Modern Elec. Mfg. Co., 812 Mulberry, Toledo, Ohio
National Elec. Corp., 226 High, Newark, N. J.
Pifer Elec. Repair & Mfg. Co., 3610 Superior Ave., Cleveland, O.
Polymet Mfg. Co., 829 E. 134th St., New York, N. Y.
Reisner Mfg. Co., W. H., Hagerstown, Md.
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Robertson, Leo F., Inc., 532 West 22nd St., New York.
Rome Wire Co. (Div. of General Cable Corp.), Rome, N. Y.
Sevisor Magneto Engrg. Co., 397 Phillips, Toledo, O.
Staten Co., 19 New Park Ave., Hartford, Conn.
Stung & Barron, 210 E. Pratt, Baltimore, Md.
Toledo Standard Commutator Co., 2242 Smead Ave., Toledo, O.
Varley Duplex Magnet Co., 15 Exchange Place, Jersey City, N. J. (Electromagnetic only).

COMMUTATOR

Bars. See Bars, Commutator.
Cement. See Cement, Commutator.
Dressers. See Stones, Commutator
Lubricants. See Compounds, Commutator.
New. See Commutators.
Refilled. See Repairing and Second Hand
Slotters. See Slotting Machines & Tools, Commutator
Slotting Files. See Files, Commutator Slotting
Soldering Machines. See Soldering Machines, Commutator
Stones. See Stones, Commutator
Tighteners. See Tighteners, Commutator
Truing Devices. See Tools, Commutator Truing

COMMUTATORS

Cameron Electric Mfg. Co., 205 Main, Ansonia, Conn.
Cleveland Commutator Co., 1882 E. 55th, Cleveland, O.
Derby Commutator Co., Derby, Conn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Toledo Standard Commutator Co., Toledo, O.

COMMUTATOR BRUSHES. See Brushes, Commutator

COMPOSITION PULLEYS. See Pulleys, Composition

COMPOUNDS, Commutator

Allen Co., Inc., L. B., 6750 Bryn Mawr Ave., Chicago, Ill
Armstrong. See Elec. Power Maintenance.
Consistency. See Warren Lubricant Co.
Cramolin, Inc., 25 W. 43rd St., New York, N. Y.
Dixon Crucible Co., Jos., Jersey City, N. J.
Doe & Co., Walter S., Kent, Ohio.
Gates. See McLennan & Co.
Goldmark Co., James, 83 Warren, New York, N. Y.
Kester Solder Co., 4201 Wrightwood Ave., Chicago, Ill
McLennan & Co., K., 1751 West 35th, Chicago.
Perfection. See Warren Lubricant Co.
Sanderson. See Warren Lubricant Co.
Sperma. See Warren Lubricant Co.
Trotters. See Goldmark Co., James.
Warren Lubricant Co., 22 Maurice, Buffalo, N. Y.

COMPOUNDS, Sealing. See Wax and Compounds

CONDENSER UNITS, Refrigerator

Bush Mfg. Co., Hartford, Conn.
McCord Radiator & Mfg. Co., Riopelle & E. Grand Ave., Detroit, Mich.
Rome-Turney Radiator Co., Rome, N. Y.

CONDENSERS, Radio. See Radio Circuit Components

CONDENSER TUBING. See Tubing, Brass and Copper

CONNECTORS, Pin-Plug

Kliegl Bros. Universal Electric Stage Ltg. Co., 321 W 50th, New York, N. Y.

CONNECTORS, Wire

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill. (Solderless-Tapeless).

CONTACT POINTS. See Points, Contact.

CONTAINERS, Shipping. See Fibre Board Products.

CONTROLLERS, Motor

Aclinestor. See Sundh Elec. Co.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 15a Grand, New York, N. Y.
Betts, Inc., James H., 1393 Sedgwick Ave., New York N. Y. (Traffic.)
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
B-Q Oil Burner Co., Stockton, Cal.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Condit Elec'l Mfg. Corp., 838 Summer St. (South Boston, Boston, Mass.
Cutler-Hammer Mfg. Co., 1288 St. Paul Ave., Milwaukee
Diamond Elect. Mfg. Co., 1330 N. 16th, Los Angeles, Cal
Dinkey. See Elec. Controller & Mfg. Co.
E C & M Youngstown. See Electric Controller & Mfg. Co.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electrite. See Sundh Elec. Co.
Hercules. See Union Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
Hornt Signal Mfg. Corp., 515 Greenwich, New York
Industrial Controller Div. of Square D Co., S. Pierce & Hanover, Milwaukee, Wis.
Maimin Speed Control Corp., 251 W. 19th, New York. (Sewing Machines.)
Monitor Controller Co., 51 Gay, Baltimore, Md.
National Electric Controller Co., 5315 Ravenswood Ave Chicago, Ill.
Refrigerating Specialties Co., 728 S. Sacramento Blvd Chicago, Ill.
Resisto. See Allen-Bradley Co.
Rowan Controller Co., 306 N. Holliday, Baltimore, Md.
Square D Co., 6060 Rivard, Detroit, Mich.
Sundh Elec. Co., Parkhurst St. at Ave. C, Newark, N. J.
Switcholone. See Condit Elec. Mfg. Co.
Thermaload. See Monitor Controller Co.
Trumbull Electric Mfg. Co., Plainville, Conn.
Temco. See Union Elec. Mfg. Co.
Unelco. See Union Elec. Mfg. Co.
Union Elec. Mfg. Co., 934 Juneau Ave., Milwaukee, Wis.
Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
W K. See Westinghouse Elec. & Mfg. Co.

COPPER. See Brass, Bronze and Copper; also Castings

COPPER TUBING. See Tubing, Brass and Copper

CORD TIPS. See Tips, Cord

CORD, Tinsel. See Tinsel Cord & Thread.

CORDS, Extension

Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

CORES, RESISTANCE COIL (Lava)

American Lava Corp., 1425 William, Chattanooga, Tenn
Crescent. See M. Kirchberger & Co.
Es-El-Co. See Southern Lava Co.
Kirchberger & Co., M., 1425 37th, Brooklyn, N. Y.
Lavite. See Steward Mfg. Co.
Lavarock. See M. Kirchberger & Co.
Southern Lava Co., Rossville, Ga.
Steward Mfg. Co., D. M., Chattanooga, Tenn.
Tennessee Burner Mfg. Co., Chattanooga, Tenn.
XL. See Tennessee Burner Mfg. Co.

CORES, RESISTANCE COIL (Refractory Porcelain)

American Lava Corp., 1425 William, Chattanooga, Tenn
Colonial Insulator Co., Akron, O.
Crowley & Co., Henry L., 545 N. Arlington Ave., East Orange, N. J.
Electrical Refractories Co., East Palestine, O
Elemite. See Louthan Mfg. Co.
Firelte. See Hartford Faience Co.
Hartford Faience Co., Hartford, Conn.
Louthan Mfg. Co., E. Liverpool, O.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa
Thermal Syndicate, 58 Schenectady Ave., Brooklyn, N. Y.
Vitreosil. See Thermal Syndicate.
Woolley, Inc., W. Douglas, East Liverpool, O.

COTTON DUCK. See Cloth, Untreated.

COTTON SLEEVING. See Tape, Cotton.

COUNTERS, Revolution. See Tachometers.

COUPLINGS, Shaft (Flexible-Insulated)

Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett Hayward Co., Baltimore, Md
Bond Co., Charles, 617 Arch, Philadelphia, Pa.
Brown Engineering Co., 123 N. Third, Reading, Pa.
Falk Corp., Milwaukee, Wis.
Delbee Rubber Co., Syracuse, N. Y.
Francke. See Smith & Serrell.
General Electric Co., Schenectady, N. Y.
Grundy. See Bond Co.
Kanti Lever. See Brown Engineering Co.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Line, W. C., Syracuse, N. Y.
Lovejoy Tool Wks., 325 W. Ohio, Chicago, Ill.
Mather. See Bond Co.
Nuttall Wks. of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Oneida. See Delbee Rubber Co.
Smith & Serrell, 5 Halsey, Newark, N. J.
Webster Mfg. Co., 1856 N. Kostner Ave., Chicago, Ill
Woodie Spec. Co., T. H., Chambersburg, Pa

COVERING MACHINES, WIRE. See Wire Manufacturers' Machines.

CUPS, Grease

Rowan Products Corp., Auburn, New York.
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Lunkenheimer Co., Cincinnati, Ohio.

CUPS, Oil

Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.

CUT OUTS, Battery. See Switches, Battery.

CUTTING OUTFITS, Metal. See Welding and Cutting Outfits.

CRANES, Floor. See Lifts, Armature.

CRYSTALS, Chandelier

Crystals, Prisms, Beads, Chains, Fringes.
Crystal Venezia. See Harrison & Co., Arthur.
Foslite. See Harrison & Co., Arthur.
Friedlaender Co., 49 W. 23rd, New York, N. Y.
Harrison & Co., Arthur, 561 W. Washington Blvd., Chicago
Hirschberg, Shuts & Co., 265 4th Ave., New York, N. Y. (Fringes.)
Nelson Bead Co., 15 W. 37th, New York, N. Y. (Importer.)
Rialto Import Co., 112 W. 4th, New York, N. Y.
Schwartz Lighting Fixture Wks., 1341 Noble, Philadelphia
Wyle & Bros., J. J., 20 E. 27th, New York, N. Y.

CURRENT INDICATORS. See Instruments, Pocket.

DASHBOARD METERS. See Instruments, Portable and Switchboard.

DECALCOMANIA

Meyercord Co., 120 S. La Salle, Chicago, Ill.
Novar. See Palm Fechteler & Co.
Palm Fechteler & Co., 67 5th Ave., New York, N. Y.

DIALS

Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts.
Enameled. See Dials, Enameled.

DIALS, Enameled

Whittier Co., Horace B., Pequabuck, Conn.

DIAPHRAGM, Cloth. See Cloth, Untreated.

DIE CASTINGS. See Castings, Die.

DIE MAKERS. See Dies, Die Makers.

DIE SETS

Baumbach Mfg. Co., 1810 Kilbourn Ave., Chicago, Ill.
Danly Machine Specialties, Inc., 2104 S. 52nd Ave., Chicago, Ill.

DIES, Pipe. See Stocks, Dies and Reamers.

DIES, DIE MAKERS

Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Caldbeck Tool & Mfg. Co., 307 East Third, Des Moines, Iowa.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Mareck & Nebel, 255 Greenwich, New York, N. Y.

DIMMER, Theatre

Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.

DISCS, Armature

Steel Discs, Laminations, and Segments for Motors and Transformers.
American Stamping Co., 978 E. 64th, Cleveland, O.
Cleveland Armature Works, 4732 St. Clair Ave., Cleveland
Hercules Elec. Steel Corp., 145 Lafayette, New York, N. Y.
Lamination Stamping Co., 764 Windsor, Hartford, Conn.
Niagara Machine & Tool Wks., 637 Northland, Buffalo
Valley Appliances, Inc., 634 Lexington Ave., Rochester N. Y.
Willor Mfg. Corp., 117 Mercer, New York, N. Y.

DRAWING MACHINES, WIRE. See Wire Drawing Mach.

DRIVE SCREWS. See Screws, Drive.

DRIVES, CHAIN. See Chain, Power Transmission.

DYNAMOMETERS

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co. Schenectady

EBONITE. See Rubber, Hard.

ELECTROLYTE. See Chemicals, Battery.

ELECTROMAGNETS. See Coils, Finished.

ELECTRODES FOR GAS SIGNS

American Neon Sign Corp., 549 W. 132nd St., New York.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Machlett & Son, 50 William, Long Island City, N. Y.
Manhattan Elect. Supply Co., 510 Sixth Ave., New York.
Q. R. S. De Vry Corp., 333 N. Michigan Ave., Chicago.

ELECTRODYNAMOMETERS. See Instruments, Laboratory Standard.

ELEMENTS, Heating. See Units, Rods and Grids

ENAMELING MACHINES (For Magnet Wire)

(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Sleeper & Hartley, Inc., 335 Chandler, Worcester, Mass

ENGRAVING MACHINES

Portable Bench and Pedestal Outfits for Marking Metal.
Brewster Co., Wm., 50 Church, New York, N. Y.
Deckel. See Preis & Co., Inc., H. P.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
(Tube Base Branders)
Engravograph Corp., 12 Vestry, New York, N. Y.
Etchograph. See Brewster Co., Wm.
Gilbert Supply Co., Independence, Iowa.
Gorton Machine Co., Geo., Racine, Wis.
Preis & Co., Inc., H. P. Newark, N. J.
Schmidt, Inc., Geo. T., 4100 Ravenswood Ave., Chicago, Ill.

ENGRAVING, Radio Panel

Engraving to Order.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa
Etch-O-Gravure. See Insuline Corp. of America.
General Fabricating Co., 165 Greenwich, New York, N. Y.
Globe Mfg. Co., 101 Spokane St., Seattle, Wash.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
New England Products Co., 232 Greenwich, New York.
Preis & Co., Inc., H. P., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill. (Tube Base Branders).
Schwenke Machine Engraving Co., 2034 Woodward Ave., Detroit, Mich.
Verichrome Laboratories, 4614 Spring Grove Ave., Cincinnati
Wright Radio Co., 114 Exchange, Rockland, Mass.

EYELETS

Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Platt Bros & Co., Waterbury, Conn
Waterbury Button & Moulding Co., 835 S. Main, Waterbury, Conn.

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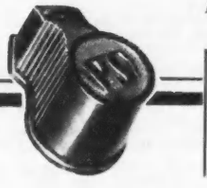

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Waterbury Button Co., 835 S. Main, Waterbury, Conn.
FABRIC, Radio Grill. See Cloth, Untreated.
FABRIC SHADES. See Shades, Fabric.
FAN BLADES. See Blades, Fan.

FEET, Felt

Brawley, T. R., 279 20th, Brooklyn, N. Y.

FELT

Advance Felt & Cutting Co., 609 W. Lake, Chicago.
American Felt Co., 211 Congress, Boston, Mass.
Booth Felt Co., 460 18th, Brooklyn, N. Y.
Brawley, T. R., 279 20th, Brooklyn, N. Y.
Western Felt Wks., 4029 Ogden Ave., Chicago, Ill.

FERRULES

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Metal Products, 490 Hancock Ave., Bridgeport, Conn.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Massachusetts Machine Shop, Inc., Boston, Mass.
Patton-MacGuyer Co., Providence, R. I.
Platt Bros. & Co., Waterbury, Conn.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., 99 Mill, Waterbury, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.

FIBRE BOARD PRODUCTS (Solid and Corrugated)

Container Corp. of America, 111 W. Washington, Dept. 26, Chicago, Ill.
Mid-West Box Co., 111 W. Washington, Chicago.
Sefton Mfg. Corp., 59 E. Madison, Chicago, Ill.
FIBER CANDLES. See Candles, Fixture.
FIBRE GEARS. See Gears and Pinions, Composition.
Paper. See Cloth and Paper.
Radio Panels. See Radio Molded Parts.
Shipping Containers. See Fibre Board Products.
Vulcanized. See Fibre, Vulcanized.

FIBRE, Phenol

Moisture Proof; Sheet, Rod, Tubes.
Aico. See American Insulator Corp.
Amerine. See American Insulator Corp.
Armite. See Spaulding Fibre Co.
Bakelite-Dilecto. See Continental Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Fibroc Insulation Co., 245 Lincoln Ave., Valparaiso, Ind.
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati, O.
Franklin Fibre Specialty Co., Wilmington, Del.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Phenolite. See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Synthane Corp., Oaks, Pa.
Vul-Cot. See National Vulcanized Fibre Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

FIBRE, Vulcanized

Sheet, Rod, Tube, Horn, Fibre, Bushings, Washers, Cleats, Screw Machine Products.
Brandywine Fibre Products Co., 1402 Walnut St., Wilmington, Del.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Egyptian. See Delaware Hard Fibre Co.
Electrosote. See Pantasote Co.
Fibro Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., Wilmington, Del.
Fyberoid. See Wilmington Fibre Specialty Co.
Independent Laboratories, 50 E. 42nd, New York, N. Y.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Iten Fibre Co., 5403 Bower Ave., Cleveland, O.
Leatheroid. See Rogers Fibre Co.
Lincoln Fibre & Specialty Co., Newport, Del.
National Vulcanized Fibre Co., Wilmington, Del.
Ohmoid. See Wilmington Fibre Specialty Co.
Pantasote Co., Inc., 250 Park Ave., New York, N. Y.
Peerless. See National Vulcanized Fibre Co.
Rogers Fibre Co., 210 Lincoln, Boston, Mass.
Spaulding Fibre Co., Tonawanda, N. Y.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass.
Vul-Cot. See National Vulcanized Fibre Co.
Vulcawood. See Continental-Diamond Fibre Co.
Wilmington Fibre Specialty Co., Wilmington, Del.
FIBRE WASHERS. See Fibre.
FIELD COILS. See Coils, Finished.

FILAMENTS, Incandescent Lamp

Cohn, Sigmund, 44 Gold, New York, N. Y.
Conneway Elec. Laboratories, 406 Jefferson St., Hoboken.
Filament Supply Co., 1317 Willow Ave., Hoboken, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J.
Radio Products Corp., Steneck Trust Bldg., Hoboken, N. J.
Sutor & Nuetzi, 3709½ Lisbon Ave., Milwaukee, Wis.
Volkmar & Sons, 187 Sylvan Ave., Newark, N. J.
(Lead-in-Welds.)

FILES, Commutator Slotting

Ideal Commutator Dresser Co., 1039 Park, Sycamore, Ill.
Martindale Electric Co., 1262 W. Fourth, Cleveland, O.
FISH PAPER. See Cloth and Paper.
FITTINGS, Fixture. See Fixture Fittings.
FIXTURE CANDLES. See Candles, Fixture.
FIXTURE CHAIN. See Chain, Fixture.
FIXTURE, Collars. See Fixture Fittings.

FIXTURE FITTINGS

	KEY
Bowl Holders	See B
Brass Fittings	See B
Canopies	See B
Collars	See B
Crow Feet	See I
Finials (Brass, Glass and Porcelain)	See B
Hangers	See H
Hickies, Brass	See B
Hickies, Iron	See I
Hooks, Brass	See B
Hooks, Iron	See I
Iron Fittings	See I
Loops, Brass	See B
Loops, Iron	See I
Rings	See B
Shade Holders	See S
Shells	See B
Spinnings	See B
Stampings	See B
Stems	See B
Straps	See H
Studs	See I

Acme Lighting Products, Inc., 2114 Woodland Ave., Cleveland, O. Straps ..... H
American Chain Co., Bridgeport, Conn. (Loops and Rings.) ..... B
American Ring Co., Waterbury, Conn. (Candle.) ..... S
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill. ..... B I
Arco. See American Ring Co.
Arrow Electric Division of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... S
Artoloid. See Great Eastern Brass Wks., Inc.
Art Metal Co., 3731 Dayton, Cleveland, O. ..... H
Banlite. See East Side Metal Spinning Co.
Banner. See Plume & Atwood Mfg. Co.
Barton Brass Wks., 3627 Superior, Detroit .. B
Belmet. See B. & L. Metal Stamping Co.
Bloch Bros., 88 Walker, New York ..... B
Brandt Mfg. Co., 3727 Gratiot Ave., Detroit. B
Braun, J. G., 609 S. Pauline, Chicago, Ill. (Pressed Ornaments.) ..... B I
B. & L. Metal Stamping Co., 250 Moore, Brooklyn, N. Y. (Also Combination Wall Bracket Hanger.) ..... B I H
Cambridge Brass Co., Cambridge, Mass. ..... H
Chase Brass & Copper Co., Waterbury, Conn. B S
Chatham Metal Spinning & Stamping Corp., 123 Mott, New York, N. Y. ..... B I
Cleanezy. See Dunlap Co.
Colonial Stamping Co., Brill St. & Passaic Ave., Newark, N. J. ..... B S
Crescent Brass Mfg. Co., Reading, Pa. ..... B
Crouse-Hinds, Solvay Sta., Syracuse, N. Y. ..... S H
Diamond Needle & Mfg. Co., Torrington, Conn. (Hickies.) I
Dunlap Co., John, Carnegie, Pa. ..... S
East Side Metal Spinning Co., 451 Greenwich, New York, N. Y. ..... B
Eureka Tin Ware Mfg. Co., 135 W. 20th, New York, N. Y. ..... S
E-Z Up. See Plume & Atwood Mfg. Co.
Faries Mfg. Co., Decatur, Ill. ..... B I S H
Flaherty Co., M. E., 28 S. Clinton, Chicago. I
Fralick Co., S. R., 15 S. Clinton, Chicago. I
Franklin Brass Foundry Co., Reading, Pa. ..... B
Friedley-Voehardt Co., Chicago. ..... B
Grabler Mfg. Co., 6565 Broadway, S. E., Cleveland, O. I
Great Eastern Brass Wks., Inc., 182 Grand, New York, N. Y. (Spindles).
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... S
Incandescent Supply Co., 468 West Broadway, New York, N. Y. ..... B H
Isco. See Incandescent Supply Co.
Jiffy. See White Mfg. Co., J. H.
Kwikun. See Fralick Co., S. R.
Lakin. See Thomas & Betts Co.
Liberty Brass Turning Co., 88 Walker, New York, N. Y. I
Liberty Iron Pipe & Nipple Works, 62 Greene, New York, N. Y. ..... B I
Liberty Machine Co., Wauwatosa, Wis. ..... B I
Light Metal Stamping Co., 310 13th St., West New York, N. J. ..... S
L & K Mfg. Co., 440 Adelphi, Brooklyn, N. Y. ..... H
L. & W. Brass Wks., 361 W. Superior, Chicago. B
Madelite. See Belson Mfg. Co.
M. S. W. Mfg. Co., 1527 Niagara Ave., Buffalo, N. Y. I
Metal Products Co., 210 Canal, New York .... B
Metro Iron Ornament Co., 191 Christie, New York, N. Y. I
Metropolitan-Columbia Mfg. Co., 714 Metropolitan Ave., Brooklyn, N. Y. ..... B
Midwest Elec. Co., 1639 Walnut, Chicago, Ill. .. I
Mid-West Chandelier Co., 14th & Chestnut Sts., Kansas City, Mo. ..... B
Mitchell-Vance Co., 70 Washington, Brooklyn, N. Y. ..... S
Monarch. See Perfeclite Co.
Murlin Mfg. Co., Philadelphia, Pa. ..... B I
National Electric Products Corp., Pittsburgh, Pa. (Studs.) I
New Era Elec. Mfg. Co., 6725 Machinery Ave., N. E., Cleveland, O. ..... H
New Wrinkle. See Bryant Elec. Co.
New York Brass Turning Co., 563 Broadway, New York, N. Y. ..... B
Nobolt. See Fralick & Co., S. R.
N. W. Cleat Receptacle Bracket, 2437 N. 29th, Philadelphia, Pa. I
Onli. See Perfeclite Co.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. B S
Perfeclite Co., 1457 E. 40th, Cleveland ..... S
Pittsburgh Valve & Fittings Co., Barberton, O. .. I
Plume & Atwood Mfg. Co., Waterbury, Conn. B S H
Plumwood. See Plume & Atwood Mfg. Co.
Plymouth. See Vester Sons, Alfred.
Products Machine Co., Bridgeport, Conn. ..... B
Reading Brass Co., 141 Schiller, Reading, Pa. B I
Ribaysen Mfg. Co., J., 952 W. Lake, Chicago, Ill. B
Rodale Mfg. Co., 200 Hudson, New York .... B H
Sandow Tool Co., 1440 Bway, New York, N. Y. .. S
Scovill Mfg. Co., Waterbury, Conn. ..... B I
Simpalite. See Sprecher Mfg. Co., P. W.
Simplex. See Plume & Atwood Mfg. Co.
Springfast. See Plume & Atwood Mfg. Co.
Square-G. See Grabler Mfg. Co.
Standard Snap-Lite Corp., 504 Jackson Ave., Long Island City, N. Y. ..... S
Standard Metal Spinning Co., 123 Mott, New York, N. Y. ..... B
Star. See Perfeclite Co.
Star. See Steel City Elec. Co.
Steel City Elec. Co., Pittsburgh, Pa. I
Steele & Johnson Mfg. Co., Waterbury, Conn. B S
Stembridge & Brandt, 29 S. Clinton, Chicago, Ill. (White Metal.) ..... B
Sterling Spinning & Stamping Wks., 476 Broome, New York, N. Y.
T. & B. See Thomas & Betts Co.
Thomas & Betts Co., 62 Vesey, New York I
Une. See Bryant Elec. Co., also Crouse-Hinds, also General Elec. Co., also Hart & Hegeman Mfg. Co., also Pass & Seymour.
United. See L & K Mfg. Co.
United Metal Spinning Co., 440 Adelphi, Brooklyn, N. Y. ..... B
Vester, Sons, Alfred, 5 Mason, Providence, R. I. B

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CLEVELAND 1302-4-6 ONTARIO ST. CHICAGO 320 WRIGLEY BLDG.

Victor. See Plume & Atwood Mfg. Co.
Virden, Div. of Gill-Virden Co., 6108 Longfellow Ave., Cleveland, O. ..... B
Walden Tool & Metal Mfg. Co., New Haven Conn. .....
Wameco. See Waterbury Metal Wares Co.
Waterbury Metal Wares Co., Waterbury, Conn. .... S
Weber Brass Co., Whitney Power Block, Cleveland, O. ..... B
White Diamond. See White Mfg. Co., J. H.
White Mfg. Co., J. H., 79 Madison Ave., New York, N. Y. ..... B S
Wilhite Machine Wks., 1245 S. Hope, Los Angeles, Cal. ..... B

FLASHERS, Sign

Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.
Ajax. See Reynolds Spring Co.
A. & W. See General Outdoor Adv. Co.
Angelus. See Electric Sign Flasher Corp.
Betts, Inc., James H., 1393 Sedgwick Ave., New York. (Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.)
Betts & Betts Corp., 545 W. 42rd, New York, N. Y. (Motor Flashers.) (Thermal Flashers.) Flashing Plugs.)
California Sign Flasher Co., 280 Guttenberg, San Francisco
Commercial Elec. Co., 1203 E. Grant, Portland, Ore.
Consolidated Elec. Sign Corp., Opalume Div., 99 West Main, Battle Creek, Mich.
Crambiet Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Diamond. See General Appliance Corp.
Dominic. See Kala-Flasher Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electric Signal Corp., 406 Fourth Ave., Seattle, Wash.
Electric Sign Flasher Corp., 1826 W. 9th, Los Angeles, Cal.
Figuregram. See Reynolds Electric Co.
Flash O-Lite. See Betts, Inc., James H.
Flip-Flop. See Betts, Inc., James H.
Gem Engineering Co., Hempstead, N. Y.
Gacor. See General Appliance Corp.
General Appliance Corp., 120 8th, San Francisco, Cal. (Flasher Button.)
General Controler Co., 200 E. First, Dayton, O.
Grazier Elec'l Products Co., Johnstown, Pa.
Harrington-Seaberg Corp., 1708 Third Ave., Moline, Ill.
Horni Signal Mfg. Co., 516 Greenwich, New York, N. Y.
Jimbetts. See Betts, Inc., James H.
Kala-Flasher Co., 344 N. Church, Kalamazoo, Mich.
Killark. See Betts & Betts Corp.
Kontroler. See General Controler Co.
Mercury. See Betts, Inc., James H.
Phelps Elec. Co., 29 S. Clinton, Chicago, Ill. (Motorless)
Phoenix Products Co., Phoenix, N. Y.
Presto Products Co., 84 University Place, New York, N. Y. (Sockets and Plugs.)
Reco. See Reynolds Elec. Co.
Reynolds Elec. Co., 2650 W. Congress, Chicago, Ill.
Reynolds Spring Co., Jackson, Mich.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Ryan. See Phoenix Products Co.
Skedoodle. See Phelps Elec. Co.
Sokit. See Betts, Inc., James H.
Thermo-Wynk. See Betts & Betts Corp.
Vacu. See Betts & Betts Corp.
Veebar. See Betts, Inc., James H.
Way, Eugene W., Seattle, Wash.
Wood Electric Co., C. D., 565 Broadway, New York N. Y.
Woodwin. See Wood Elec. Co., C. D.
Wynk-A-Lyte. See Betts & Betts Corp.
FLASHLIGHT LENSES. See Lenses.
FLEXIBLE ARMS. See Tubing, Flexible Metallic.
FLEXIBLE LEADS, Commutator Brush. See Brushes, Commutator.

FLEXIBLE SHAFTING

Binghamton Flexible Shaft Co., 239 Water, Binghamton, N. Y.
Chicago Flexible Shaft Co., 5600 W. Roosevelt Rd., Chicago, Ill.
Haskins Co., R. G., 4636 W. Fulton, Chicago, Ill.
Stow Mfg. Co., 443 State, Binghamton, N. Y.
Strand & Co., N. A., 500 N. Lincoln, Chicago, Ill.
FOIL, Tin. See Tin Foil.

FORGINGS, Non-Ferrous

Scovill Mfg. Co., Waterbury, Conn.

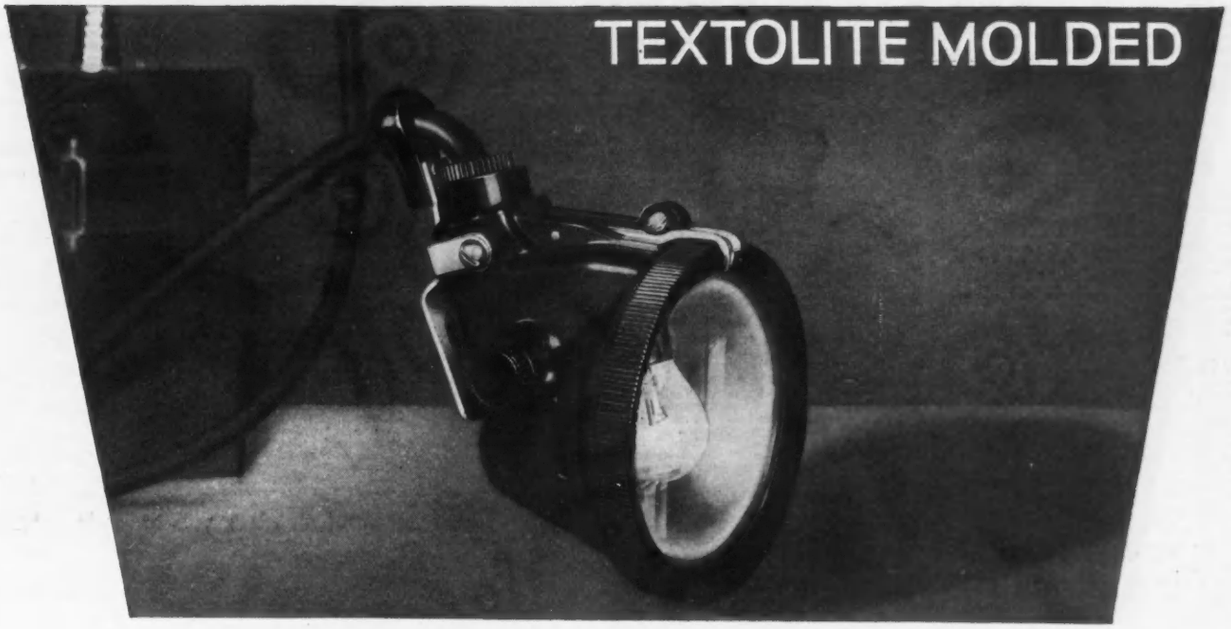
FORMS, Coil Winding

Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, O.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Master. See Armature Coil Equipment Co.

FORMS, Wire

Forms and Frames for Shade Holders and Shades: Bending, Welding, Forming.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
Arrow Wire Frame Corp., 344 E. 23rd, New York, N. Y.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn
Central Wire Frame Co., 154 E. 23rd, New York, N. Y. (Complete with socket, cord and plug.)
Chelsea Wire Wks., 675 Hudson, New York, N. Y.
Clark Metal Products Inc., 490 Hancock Ave., Bridgeport, Conn.
City Wire Frame Co., 2925 S. Michigan Ave., Chicago.
Electro Weld Co., 70 Munroe, Lynn, Mass.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Hubbard Spring Co., M. D., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Jeschke Wire Specialty Wks., Crawfordsville, Ind.
Krischer's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Manhattan Wire Products Co., 398 First Ave., New York.
Murray Hill Wire Frame Co., 314 E. 32nd, New York, N. Y.
Roebling's Sons Co., John A., Trenton, N. J.

MOLDED BY GENERAL ELECTRIC



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FORMS, Wire—Continued
Steinen & Co., 297 Washington, Newark, N. J.
Watral & Sons, 133 E. 16th, New York, N. Y.
Young Industries, Inc., L. A., Detroit, Mich.
FRAMES, Wire. See Forms, Wire.
FRICTION TAPE. See Tape, Rubber and Friction.
FRINGE, Chandelier. See Crystals, Chandelier.

FUSE CLIPS

Sherman Mfg. Co., H. B., Battle Creek, Mich.
Waterbury Brass Goods Co., Waterbury, Conn.
FUSE PLUG SCREW SHELLS. See Shells, Screw Socket.
FUSE TESTERS. See Testers, Fuse and Circuit.

FUSES AND FUSE WIRE

KEY
Cartridge ..... See C
Plug ..... See P
Non-Refillable ..... See N
Refillable ..... See R
Open Link ..... See O
Fuse Wire ..... See O

Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... P
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa. ..... O
Argious. See Economy Fuse Mfg. Co.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... P N
Automatic Elec. Iron & Fuse Co., 215 S. American, Philadelphia, Pa. ..... P
Buss. See Bussman Mfg. Co.
Bussmann Mfg. Co., University & Jefferson Ave., St. Louis ..... C P N R O
Chase-Shawmut Co., Newburyport, Mass. ..... C P N R O
Clearsite. See Economy Fuse & Mfg. Co.
Clear-Top. See Trico Fuse Mfg. Co.
Colortop. See Trico Fuse Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Automobile) ..... C . . N R . .
Commercial Enclosed Fuse Co., 1317 Willow Ave., Hoboken, N. J. ..... C P N . . .
Cote Bros. Mfg. Co., 182 W. Lake, Chicago ..... C P . . R . .
Crystal. See Royal Elec. Co.
Daum Fuse & Elec. Mfg. Co., 1157 Hodgkins, Pittsburgh ..... C . . . . R . .
D. & W. See Graybar Electric Co.
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. ..... C P N R .
Eco. See Economy Fuse & Mfg. Co.
Electric Fuseguard Co., Charlottesville, Va. ..... C P N R . .
Elliott Electric Co., Shreveport, La. ..... .
Gem. See Chicago-Jefferson Fuse & Electric
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... C P N R . .
Graybar Electric Co., Graybar Bldg., Lexington Ave. and 43rd St., New York, N. Y. ..... C . . . . . .
Great Western Fuse Co., 415 Lexington Ave., New York, N. Y. ..... C . . . . R . .
H. & H. See Hart & Hegeman.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... P . . R . .
Hudson Wire Co., Ossining, N. Y. ..... O
Kantark. See Trico Fuse Mfg. Co.
Kirkman Engrg. Co., 1 Dominick St., New York, N. Y. ..... C P N . . O
Littelfuse Laboratories, 1772 Wilson Ave., Chicago, Ill. (Low Capacity, Glass Enclosed, .025 to 2 Amp.) .....
Monarch Fuse Co., 116 E. First, Jamestown, N. Y. ..... C . . N R . .
National. See Economy Fuse & Mfg. Co.
Neark. See Colt's Patent Fire Arms Mfg. Co.
Pierce Renewable Fuses, Inc., 752 Main, Buffalo, N. Y ..... C P . . R . .
Platt Bros. & Co., Waterbury, Conn. ..... O
Powell, F. W., 119 W. Ohio, Pittsburgh ..... P . . R . .
Ree-Nu-It Elec. Co., New Bedford, Mass. ..... C P . . R . .
Rochester Re-Fill Fuse Co., 402 Cottage, Rochester, N. Y. ..... C . . . R . .
Royal Elec. Co., Chelsea Station, Boston ..... P N . . . .
Shawmut. See Chase-Shawmut Co.
Simplicity. See Cote Bros. Mfg. Co.
Six-in-One. See Industrial Engrg. Co.
Star Fuse Co., 225 Canal, New York, N. Y. ..... C P . . R . .
Trico Fuse Mfg. Co., 1001 McKinley Ave., Milwaukee ..... C P N R . .
Union. See Chicago-Jefferson Fuse & Electric

GALVANIZING

Cattle & Bros., Joseph P., Gaul and Letterly Sts., Philadelphia, Pa.
GALVANOMETERS. See Instruments, Laboratory Standard.

GAS, Inert

Heatun Co., Louisville, Ky.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Weber, Alfred, 5 Union Square, New York, N. Y.

GAS SIGN ELECTRODES. See Electrodes for Gas Signs

GASKETS, Rubber

Gutta Percha & Rubber Mfg. Co., 15 Park Row, New York.
Canfield Rubber Co., Bridgeport, Conn.
GAUZE BRUSHES, Wire. See Brushes, Commutator.
GEARS, Fibre. See Gears and Pinions, Composition.

GEARS (Speed Changing Units)

Cleveland Worm & Gear Co., Cleveland, Ohio.
Cullman Wheel Co., 1346 Altgild, Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Falk Corp., Milwaukee, Wis.
Farrell-Birmingham Co., 344 Vulcan, Buffalo, N. Y.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago, Ill
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Jones Fdy. & Machine Co., W. A., Chicago, Ill.
Lipe, W. C., Syracuse, N. Y.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Palmer-Bee Co., Detroit, Mich.
Ohio Gear Co., 1333 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield Mass.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.
Smith, Winfield H., Springville, N. Y.

GEARS, Worm

Albaugh-Dover Mfg. Co., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, Ohio
Colburn Gear & Mfg. Co. (Norfolk Downs), Quincy, Mass.
Ohio Gear Co., 1333 E. 179th, Cleveland, Ohio.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.

GEARS AND PINIONS, Composition

Continental-Diamond Fibre Co., Bridgeport, Pa.
Delaware Hard Fibre Co., Box 570M Wilmington, Del.
Fabroil. See General Elec. Co.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Stani Gear Co., 1390 E. 40th, Cleveland, Ohio.
Stranahan Gear Co., Philadelphia, Pa.
Textoil. See General Electric Co.
Textolite. See General Electric Co.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GEARS AND PINIONS, Iron and Steel

Chicago Stock Gear Wks., 769 W. Jackson Blvd., Chicago
Barie Gear & Machine Co., Wayne Junction, Philadelphia.
Falk Corp., Milwaukee, Wis.
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Medart Co., St. Louis, Mo.
Meisel Bros. Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.
Perkins Machine & Gear Co., 120 Circuit Ave., Springfield, Mass.
Permag. See Perkins Machine.
Tool Steel Gear & Pinion Co., Cincinnati, Ohio.

GEARS AND PINIONS, Rawhide

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill
Gerdes & Co., 50 Church, New York, N. Y.
Syracuse Rawhide Mfg. Co., Syracuse, N. Y.
Western Rawhide & Belting Co., Milwaukee, Wis.
GENERATORS, Electroplating. See Plating Generators
GLASS BULBS. See Bulbs, Glass.
GLASS CANDLES. See Candles, Fixture.
GLASS LETTERS. See Letters, Sign.

GLASS for Electrical Purposes

Corning Glass Wks., Corning, N. Y.
Pyrex. See Corning Glass Wks.

GLASSWARE

Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y. "Equalite."
Beaumont Co., Morgantown, W. Va.
Chesler & Sons, J., 45 Varick Ave., Brooklyn, N. Y.
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Corning Glass Co., Corning, N. Y. "Aurene," "Calcite."
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Gillinder Bros., Inc., Port Jervis, N. Y. "Apollo," "Embroidro," "Celatone."
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Gleason-Tiebout Glass Co., 99 Commercial, Brooklyn, N. Y. "Alabaster," "Amazon," "Blanco," "Carmia," "Carrara," "Celestialite," "Florentine," "Gletian," "Gletieco," "Opalux," "Polycase," "Silverglow."
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Pittsburgh Cut Glass Co., Monaca, Pa.
Plaut & Co., L., 432 E. 23rd, New York, N. Y. "Berylite."
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Steimer, Doran & Rowe, 336 Fourth Ave., Pittsburgh, Pa. "Radax."
United Novelty Glass Mfg. Co., 121 Prince, New York, N. Y.
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INSTRUMENTS, Laboratory Standard. See Instruments Laboratory Standard.
INSTRUMENTS, Portable Testing. See Instruments, Portable and Switchboard: also Instruments, Pocket.

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Strobatchy. See Argco Laboratories, Inc.
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Weston Elecl. Instrument Corp., 582 Freilinghuysen Ave., Newark, N. J.

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Square D Company, Detroit, Mich.
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Ground-Ohmer. See Sticht & Co.
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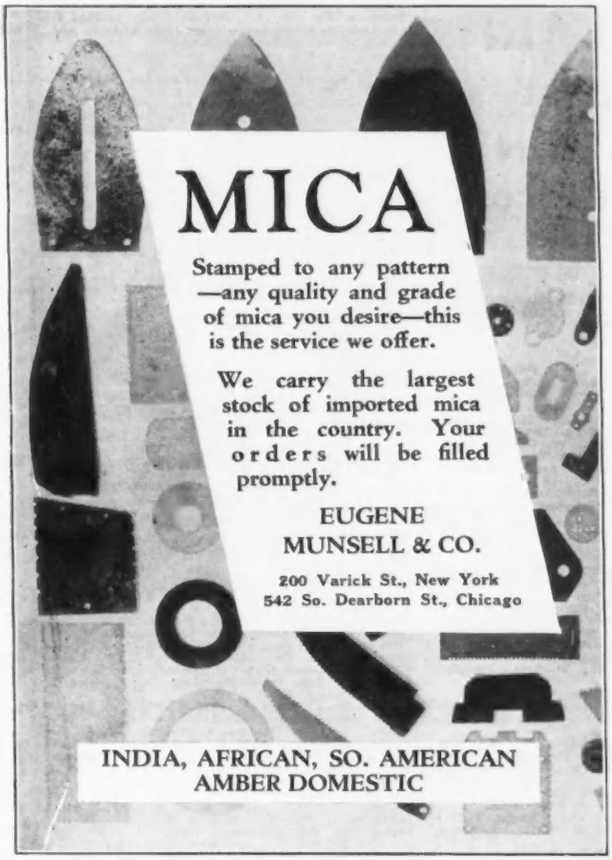
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Jack Horner. See Operadio Mfg. Co.
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Thompson Radio Co., 25 Church, New York, N. Y.
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United Reproducers Corp., 25 Leighton Ave., Rochester, N. Y.
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Standard Parts	See S
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Bryant Electric Co., Bridgeport, Conn.	P
Connecticut Elec. Mfg. Co., Bridgeport, Conn.	S
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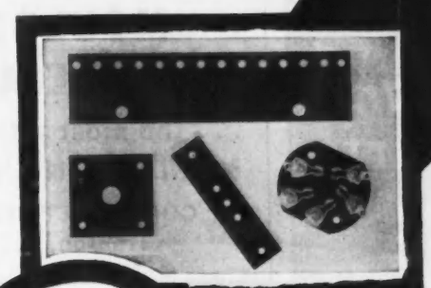
Eagelite. See Eagle Elec. Mfg. Co.	
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.	P
General Elec. Co., Merchandise Dept., Bridgeport, Conn.	S P
Glow Lite. See Rodale Mfg. Co.	
Glow Tip. See Arrow Electric Co.	
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Electric Co., Hartford, Conn.	S P
Hubbell, Inc., Harvey, Bridgeport, Conn.	P
Luma & Luma Lite. See Radium Dial Co.	
Radieye. See General Electric Co.	
Radium Dial Co., 3332 Forbes, Pittsburgh, Pa.	C P
Reynolds Spring Co., Jackson, Mich.	S
Rodale Mfg. Co., 200 Hudson, New York, N. Y.	P
Seelite. See T. C. Smith & Co.	
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia	P
Spot O Life. See Hart & Hegeman Mfg. Co.	
Undark. See United States Radium Corp.	
United States Radium Corp., 535 Pearl, New York, N. Y.	C S P

MACHINE SCREWS. See Screws, Machine.
MACHINE SCREW PRODUCTS. See Screw Machine Products.

MACHINES
Armature Banding. See Banding Machines, Armature.
Armature Notching. See Notching Machines, Armature.
Balancing. See Balancers, Armature.
Banding. See Banding Machines, Armature.
Cable Armoring. See Wire Manufacturing Machines.
Coil Shaping. See Shaping Machines, Coil.
Coil Taping. See Taping Machines, Coil.
Coil Winding. See Winding Machines.

If I Were a Manufacturer
of Motor Driven Machinery
By George A. Arnold
on page 32 *of this issue*



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MACHINES—Continued
Commutator Slotting. See Mica Undercutters.
Engraving. See Engraving Machines.
Incandescent Lamp Making. See Machines, Lamp Making.
Molded Insulation. See Presses, Molded Insulation.
Perforating. See Perforating Machines.
Porcelain Molding. See Presses, Porcelain Molding.
Radio Tube. See Machines, Lamp Making.
Shaping. See Shaping Machines, Coil.
Slotting. See Mica Undercutters.
Soldering. See Soldering Machines, Commutator.
Spring Making. See Spring Making Machines.
Taping. See Taping Machines, Coil.
Tension. See Tension Machines, Band Wire.
Winding. See Winding Machines.
Wire, Armoring. See Wire Manufacturing Machines.
Wire Drawing. See Wire Drawing Machinery.
Wire Insulator. See Wire Manufacturing Machines.
Wire Measuring. See Wire Manufacturing Machines.
Wire Tension. See Tension Machines, Band Wire.
Wire Wrapping. See Wire Wrapping Machines.

MACHINES, Lamp Making

For Making Incandescent Lamps and Vacuum Tubes.
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Berrenberg, R., 13 Farnham (Roxbury), Boston, Mass. (Vacuum Pumps.)
Cserwenka, Frank, 35 Monroe, Passaic, N. J. (Bombarding Machines.)
Dwyer Machine Co., Lynn, Mass.
Elsler Electric Corp., 770 S. 13th, Newark, N. J.
General Engineering & Supply Co., 160 5th Ave., New York, N. Y. (Filament Winder.)
Genco. See General Engineering & Supply Co.
Rhamm Mfg. Co., 124 45th, Union City, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
York Elec. & Machine Co., 30 Penn, York, Pa.

MACHINES, Bombarding. See Machines, Lamp Making.
MACHINES, Pleating and Fluting. See Pleating Machines.
MACHINES, Spring Making. See Spring Making Machines.
MACHINES, WIRE MANUFACTURING. See Wire Manufacturing Machines.
MAGNET CHARGERS. See Chargers, Magnet.
MAGNET STEEL. See Steel, Magnet.
MAGNET TESTERS. See Instruments, Portable and Switchboard; also Instruments, Pocket.
MAGNET WIRE MACHINES. See Enameling Machines for Magnet Wire.
MAGNETIC CHUCKS. See Chucks, Magnetic.
MAGNETIC CLUTCHES. See Clutches, Magnetic.
MAGNETOMETERS. See Instruments, Pocket.

MAGNETS, Permanent

Bullens Co., D. K., Pottstown, Pa.
Ind. Steel Products Co., 4545 S. Western Blvd., Chica.
Rogers Drop Forging Co., Worcester, Mass.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.

MALLETS, Raw Hide

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Crude Pelt. See Chicago Rawhide Mfg. Co.
Holbrook Raw Hide Mfg. Co., 748 N. Main, Providence, R. I.

MANGANESE, Battery. See Chemicals, Battery.

MARKERS AND STAMPERS, Metal

Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.

MEASURING INSTRUMENTS. See Instruments.
METAL CUTTING OUTFITS. See Welding and Cutting
MECHANICAL RUBBER GOODS. See Rubber Mechanical Goods.
MEGOHMMETERS. See Instruments, Laboratory Standard
MERCURY SWITCHES. See Switches, Mercury.
METAL CLEANERS (Compound). See Cleaners, Metal.
Outfits.
METAL FINISHING. See Plating & Finishing.
METAL MARKING OUTFITS. See Engraving Machines.
METALLIC SHADES. See Shades, Metallic.
METERS. See Instruments.
MICA SHADES. See Shades, Mica.
MICA TAPE. See Tape, Mica.
MICA UNDERCUTTERS. See Slotting Machines & Tools, Commutator.

MICA

Asheville Mica Co., Biltmore, N. C.
Asco. See Schoonmaker Insulation Co.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Colonial Mica Co., 136 Seventh, Jersey City, N. J.
Fillion, S. O., 48 Murray, New York, N. Y.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Gerdau Co., Otto, 533 Canal, New York, N. Y.
Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y.
Hoyt, Inc., Philip S., Los Tablos, New Mexico.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
International Mica Co., 3660 Brandywine, Philadelphia, Pa.
Kant Krack. See Huse Liberty Mica Co.
Keene Mica Co., Keene, N. H.
Macallen Co., Boston 27, Mass.
Micabond. See Chicago Mica Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Miralite. See Mitchell-Rand Mfg. Co.
Mica Insulator Co., 205 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Micanite. See Mica Insulator Co.
Mica Products Mfg. Co., 54 Greene, New York, N. Y.
Munsell & Co., Eugene, 200 Varick, New York, N. Y.
Nemco. See New England Mica Co.
New England Mica Co., Waltham, Mass.
New England Minerals, Inc., 85 Devonshire, Boston, Mass
New York Mica & Mfg. Co., Auburn, N. Y.
Peerless. See New England Mica Co.
Prestonite. See Robt. K. Preston Mica Co.
Preston Mica Co., Robt. K., 957 Monadnock Blk., Chicago (Ground Mica.)
Red Streak. See Huse Liberty Mica Co.
Rogers-Pyatt Shellac Co., 81 Water St., New York. (Imp.)

Schoonmaker Insulation Co., A. O., 34 University Place, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Watson Bros., 170 Purchase, Boston, Mass.

MINIATURE SWITCHBOARD SYSTEMS. See Instruments, Portable and Switchboard.
MIXERS, INSULATION. See Insulation Mixers.

MOLDED
Presses. See Presses, Molded Insulation.
Radio Parts. See Radio Molded Parts.
Shades. See Molded Insulation.

MOLDED INSULATION

Also. See American Insulator Corp.
Allen & Hills, Inc., Auburn, N. Y.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa. (Cold.)
Ambleroid. See Ambler Asbestos Shingle & Sheathing Co.
American Insulator Corp., New Freedom, Pa.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
Amerine. See American Insulator Corp.
Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Auburn Button Wks., 48 Canoga, Auburn, N. Y.
Bakelite Corp., 247 Park Ave., New York, N. Y.
Bay State Moulding Co., 1197 Dorchester Ave., Boston.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Beldenmold. See Belden Mfg. Co.
Bell Mfg. Co., 11 Elkins, Boston, Mass. Radio Parts.
Bettle. See Synthetic Plastics Co., Inc.
Boonton Molding Co., Boonton, N. J.
Boonton Rubber Mfg. Co., 223 Fanny Rd., Boonton, N. J.
Brewlite Moulding Corp., 109 Hudson, Jersey City, N. J. (Wood Composition.)
Celluloid Corp., 10 E. 40th, New York, N. Y.
Cepco. See Monowatt Corp.
Cetec. See Monowatt Corp.
Cetelite. See Monowatt Corp.
Celtrock. See Colt's Patent Firearms Mfg. Co.
Chicago Molded Products Co., 2149 Walnut, Chicago, Ill.
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, O.
Colasta Co., Hoosick Falls, N. Y.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site, Inc., 207 Astor, Newark, N. J.
Condensite. See Bakelite Corp.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dayton Insulating Moulding Co., 434 E. First, Dayton, Ohio
Diemoulding Production Co., Canastota, N. Y.
Dimec. See Dayton Insulating Moulding Co.
Durez. See General Plastics Inc.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Electrose. See Insulation Mfg. Co.
Erinoid Co., Park Row Bldg., New York, N. Y.
Evercoid. See Bakelite Corp.
Formica Insulation Co., 4626 Spring Grove Ave., Cincin.
Garfield Mfg. Co., Garfield, N. J. Composition. (Cold.)
General Electric Co., Schenectady, N. Y.
General Moulded Composition Co., 912 Market, Lynn, Mass.
General Plastics, Inc., 129 Walck Rd., N. Tonawanda, N. Y.
Grotelite Co., Grandview & Lafayette Aves., Bellvue, Ky.
Gummor. See Garfield Mfg. Co.
Hahn Mfg. Co., Harry W., 823 S. San Pedro, Los Angeles, Cal.
Herculite. See Colonia Co.
Hi-Heat. See Insulation Mfg. Co.
Imperial Molded Products Co., 2925 W. Harrison, Chicago.
Imperoo. See Insulation Products Co.
Inda. See American Machine & Foundry Co.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Insulation Products Co., Richland, Pittsburgh, Pa.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
International Insulating, Division of General Industries Co., Syria, Ohio.
Karolith Corp., 139 13th, Long Island City, N. Y. (Casein plastics.)
Kellite. See Kellogg Switchboard & Supply Co.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Klages, Chas., 198 147th, Ozone Park, N. Y.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Kurz-Kasch Co., Dayton, O.
Lacanite. See Scranton Button Co.
Luco Products Corp., 46 Flatbush Ave. Extension, Brooklyn, N. Y.
Lumarith. See Celluloid Corp.
Luxite. See Wilbur & Williams Co.
Macallen Co., Boston, 27, Mass.
Mack Molding Co., Wayne, N. J.
Makalot. See Johnson Molding & Tool Co.
Megohom. See Waterbury Button Co.
Micarta Fabricators, Inc., 309 Canal, New York, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co.
Mico. See Molded Insulation Co.
Modern Molded Products Co., Blount and Elm Sts., Providence, R. I.
Molded Insulation Co., Mt. Vernon, N. Y.
Monowatt Corp., 24 W. 40th, New York, N. Y.
New England Products Co., 232 Greenwich, New York, N. Y.
Niagara Insul-Bake Specialty Co., 483 Delaware Ave., Albany, N. Y.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Norloc. See Norton Laboratories, Inc.

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Northern Industrial Chemical Co., 11 Elkin, South Boston.
Norton Laboratories, Inc., 1025 Mill, Lockport, N. Y.
Panelyte Corp., Trenton, N. J.
Paramix. See Splitdorf Radio Corp.
Paratherm. See Scranton Button Co.
Phenolic. See Scranton Button Co.
Plastic Molding Corp., Sandy Hook, Conn. (Cold.)
Pollopas. See Wilbur & Williams.
Pruven Composition Products Corp., Milford, Conn.
Pruvenite. See Pruven Composition Products Co.
Pyrolax. See Cutler-Hammer Mfg. Co.
Recto Mfg. Co., 23 W. 3rd, Cincinnati, O.
Redmonol. See Bakelite Corp.
Rexlite. See Northern Industrial Chemical Co.
Reynolds Spring Co., Jackson, Mich.
Reynolditc. See Reynolds Spring Co.
Reynomold. See Reynolds Spring Co.
Richardson Co., Lockland, Cincinnati, O.
Ridgelite. See Ridgley Trimmer Co.
Ridgley Trimmer Co., Springfield, O.
Schneider Bros., Inc., 212 N. Sheldon Ave., Chicago.
Scranton Button Co., Scranton, Pa.
Shaw Insulator Co., Irvington, Newark, N. J.
Siemon Co., State and Dewey, Bridgeport, Conn.
Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.
Star Insulate. See Insulation Mfg. Co.
Starite. See Insulation Mfg. Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Stokes & Smith Co., Summerdale Ave. near Roosevelt Blvd., Philadelphia, Pa.
Synthetic Plastic Co., Inc., 535 Fifth Ave., New York, N. Y. (Molding Powder).
Textolite. See General Elec. Co., also Electrical Insulation Corp.
Thermoplax. See Cutler-Hammer Mfg. Co.
Tegit. See Garfield Mfg. Co.
Union Insulating Co., Parkersburg, W. Va.
Vulcabeston. See Colt's Patent Fire Arms Mfg. Co.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.
Waterbury Button & Moulding Co., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilbur & Williams Co., 261 Park Square Bldg., Boston, Mass. (Molding Powder.)

MOLYBDENUM

American Electro Metal Corp., 65 Madison Ave., New York, N. Y.
Elkon, Inc. (Div. of P. R. Mallory Co.), 350 Madison Ave. New York, N. Y.
Lohfeld & Co., J. L., 53 Park Place., New York, N. Y.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Radiotherma, Inc., 45 E. 17th, New York, N. Y.
Sirian Wire Co., 255 Sherman Ave., Newark, N. J.

MONEL METAL

International Nickel Co., 67 Wall, New York, N. Y.

MOTOR CONTROLLERS. See Controllers, Motor.
MOTOR PLATFORM BASES. See Bases, Motor Platform
MOTOR STARTERS. See Controllers, Motor; Switches, Remote Control; Switches, Motor Starting; Safety; Switches Snap (Heavy Duty).

MOTORS

Alternating Current ..... See S
Direct Current ..... See S
Motors, 1 Hp. up ..... See M
Motors Fractional Hp. ..... See F
Universal ..... See U

Actodector. See Roth Bros. Co., Div. of Century Electric Co				
Advance Elec. Co., 4311 Maple Ave., St. Louis	M	F	S	..
Allis-Chalmers Mfg. Co., Milwaukee, Wis.	M	..	S	..
Allis Co., Louis, Milwaukee, Wis.	M	..	S	..
American Elec. Motor Co., Cedarburg, Wis.	M	..	..	..
Apex Elec'l Mfg. Co., 1067 E. 152nd, Cleveland	..	F	S	U
Armor Elec. Mfg. Co., 1020 Holland, Erie, Pa.	M	..	..	..
Baldor Elec. Co., 4352 Duncan Ave., St. Louis	M	F	S	..
B-Line. See Brown-Breckmeyer Co.				
Bodine Elec. Co., 2254 Ohio, Chicago	..	F	S	U
Bogue Elec. Co., Chas. J., 132 King, New York	M	..	..	..
Brown-Brockmeyer Co., Norwood Power Bldg., Dayton, O.	M	F	..	..
Burke Elec. Co., Erie, Pa.	M	F	S	U
B. T. See Allis Co., Louis.				
B & R Mfg. Co., 812 Lafayette, Toledo, O.	..	F	..	..
Century Elec. Co., 1806 Pine, St. Louis, Mo.	M	F	S	..
Chandeysson Elec. Co., St. Louis, Mo.	M	..	S	..
Clark, Jr., Elec. Co., James, 600 E. Bergman, Louisville, Ky.	M	..	..	..
Cleveland Armature Wks., 4732 St. Clair Ave., Cleveland, O.	M	..	S	..
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.				
Continental Elec. Co., 14 Magazine, Newark	M	..	S	..
Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J.	M	..	S	U
Cushman Elec. Co., Concord N. H.	M	F	S	..
Day-Fan Electric Co., Dept. A, Dayton, O.	..	F	S	..
Diehl Mfg. Co., Elizabeth, N. J.	M	F	S	..
Diverter Pole. See Rochester Elec. Product Co.				
Domestic Electric Co., 7209 St. Clair Ave., Cleveland, O.	..	..	S	U
Dumore Co., 25 16th, Racine, Wis.	..	F	..	U
Reliance. See Fidelity Elec. Co.				
Electric Machinery Co., Minneapolis, Minn.	M	..	S	..
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O.	..	..	..	..
Electric Specialty Co., 221 South Stamford, Conn.	M	F	S	U
Electro-Dynamic Co., Bayonne, N. J.	M	..	S	..
Emerson Electric Mfg. Co., 2014 Washington Ave., St. Louis, Mo.	M	F	S	U
Engberg's Div., Troy Engine & Machine Co., St. Joseph, Mich.	M	..	S	..
Esco. See Electric Specialty Co.				
Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Ill.	M	F	..	..
Fidelity Elec. Co., Lancaster, Pa.	M	F	S	..
Fitzgerald Mfg. Co., Torrington, Conn.	..	F	..	..
Fynn Weichsel. See Wagner Elec. Corp.				
Galvin Elec. Mfg. Co., 3314 S. Broadway, St. Louis, Mo.	F	..	S	..

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Dielectric strength—400-600 volts per Mil. Phase angle difference 1½% to 2%. Crushing strength approximately 36,000 pounds per square inch. Does not shatter. Does not deteriorate with age. Moisture absorption ½% in 24 hours. Weight about twenty cubic inches per pound. Specific gravity about 1.3. Unaffected by oil, grease or ordinary solvents. Individual samples have shown 1600 volts per Mil. under official and disinterested tests. Cuts out economically. Easily milled, turned, punched, sawed, stamped and threaded.

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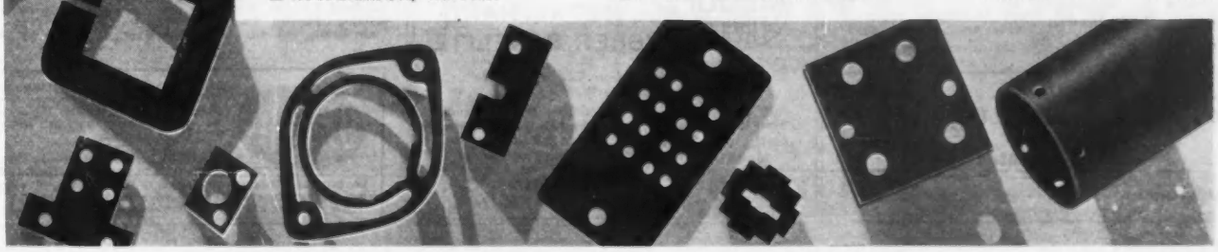

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MOTORS—Continued
General Elec. Co., Schenectady, N. Y..... M F S U
Gilbert Co., A. C., New Haven, Conn..... F U
Hamilton Beach Mfg. Co., Racine, Wis..... F S U
Hobart Bros. Co., Troy, O..... M S
Holtzer-Cabot Elec. Co., 125 Amory, Boston... M F S
Howell Elec. Motors Co., Howell, Mich..... M S
Ideal Elec. & Mfg. Co., Mansfield, O..... M S
Imperial Electric Co., Akron, O..... M S
Janette Mfg. Co., 551 W. Monroe, Chicago..... F S
Jantz & Leist Elec. Co., Cincinnati, O..... M F
Jeannin Electric Co., Fassett & N. Y. C. R. R. Toledo, O..... M F S
Kendrick & Davis Co., Lebanon, N. H..... F S
Kimble Elec. Co., 634 N. Western Ave., Chicago M F U
Knapp Elec., Inc., Portchester, N. Y..... F S U
Leland Elec. Co., Dayton, O..... F S
L. E. See Leland Elec. Co.
Lincoln Elec. Co., Cleveland, Ohio..... M S
Line-Weld. See Lincoln Elec. Co.
Linsee Elec. Motor Co., Mansfield, O..... M
Mando Co., 911 State Tower Bldg., Syracuse, N. Y. (6-12-40 Volt only)..... F
Marathon Elec. Mfg. Co., 32 Island, Wausau, Wis.. F
Marble-Card Elec. Co., Gladstone, Mich..... M
Master Electric Co., Dayton, O..... M F S
MC. See General Electric Co.
Michigan Elec. & Mfg. Co., Lake Linden, Mich.. F S
N. C. See Electric Controller & Mfg. Co.
Norfolk. See Walter Elec. Mfg. Co.
North East Appliance Corp., Rochester, N. Y.. F U
Northwestern Mfg. Co., 480 Clinton, Milwaukee M
Ohio Elec. & Controller Co., 5903 Maurice Ave., Cleveland, Ohio..... F S
O. K. See Marathon Elec. Mfg. Co.
Osann Co., F., 245 Seventh Ave., New York M
Peerless Elec. Co., 740 W. Market St., Warren, O. M F S U
Polar Cub. See Gilbert Co., A. C.
Pow-R-Full. See Wagner Elec. Corp.
Reco. See Reynolds Electric Co.
Red Band. See Howell Elec. Motors Co.
Reliance Elec. & Engrg. Co., 1042 Ivanhoe Rd., Cleveland, O..... M S
Reynolds Electric Co., 2550 W. Congress, Chicago.. F S
Robbins & Myers, Inc., Springfield, O..... M F S U
Roth Bros. & Co., Div. of Century Elec. Co., 1400 W. Adams, Chicago, Ill..... M F S
Standard. See Robbins & Myers Co.
Star Elec. Motor Co., Miller St. & N. J. R. R. Ave., Newark, N. J..... M S
Sterling Elec. Motors, Inc., Telegraph Rd. and Atlantic Blvd., Los Angeles, Cal..... M S
Stow Mfg. Co., Binghamton, N. Y..... M F S U
Sturtevant Co., 15 Devonshire (Hyde Park), Boston, Mass..... M F S U
Sunlight Electrical Mfg. Co., Warren, O..... F S
Super Wick. See Master Elec. Co.
Switch start. See Lincoln Elec. Co.
Union Elec. Motor Mfg. Co., Hancock & Oxford Sts., Philadelphia, Pa..... M F S
U. S. Elec. Mfg. Co., 200 E. Slawson Ave., Los Angeles..... M S
Valley Elec. Co., 4221 Forest Park Blvd., St. Louis, Mo..... M S
Wagner Elec. Corp., 6400 Plymouth Ave., St. Louis, Mo..... M F S U
Walter Elec. Mfg. Co., Norfolk, Va..... M S
Watson. See Allis Co., Louis.
Weico Uniframe. See Wesche Elec. Co., B. A.
Wesche Elec. Co., B. A., 1622 Vine, Cincinnati M F S
Westinghouse Elec. Mfg. Co., East Pittsburgh M F S
Willey-Wray Elec. Co., 1522 Central Parkway, Cincinnati, O..... M S
Woods Mach. Co., S. A., Boston..... M F S
Zobell Elec. Motor Co., Garwood, N. J..... M S

NAME PLATES
See also Decalcomania
Angell Embossing Co., 37 Barney-Smith Co., Dayton, O.
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Continental-Diamond Fibre Co., Bridgeport, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Electro-Chemical Engraving Co., 52 Vanderbilt Ave., New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y.
Etching Co. of America, 1520 Montana, Chicago, Ill.
General Etching & Mfg. Co., 3070 W. Grand Ave., Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Mayer & Co., Geo. J., 50 S. Meridian, Indianapolis, Ind.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
Premier Metal Etching Co., 14th & Van Alst Ave., Long Island City, N. J.
Turner Brass Works, Sycamore, Ill.
Waterbury Button & Moulding Co., Waterbury, Conn.

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Driver-Harris Co., Harrison, N. J.
International Nickel Co., 67 Wall, New York, N. Y
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Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo, N. Y.

NUT SETTING MACHINES
Vim Electric Tool Co., 149 Broadway, New York, N. Y.

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OIL-LESS BEARINGS. See Bearings, Oil-less.

OSCILLOSCOPES. See Instruments, Laboratory Standard.

OVENS, Industrial and Laboratory
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Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Buffalo Fdry. & Machine Co., 1545 Fillmore, Buffalo, N. Y. (Armature and Coil.)
Conran, Frederick M., 107 Colden, Newark, N. J.
Crawford Oven Co., New Haven, Conn. (Coil Driers.)
Despatch Oven Co., 822 Ninth, S. E., Minneapolis, Minn.
Detroit Sheet Metal Wks., 1341 E. Milwaukee Ave., Detroit, Mich.
Devine Mfg. Co., J. P., Mount Vernon, Ill.
Eberbach & Son Co., Ann Arbor, Mich. (Drying.)
Electric Heat Control Apparatus Co., 245 New Jersey R. R. Ave., Newark, N. J.
Emerson Apparatus Co., Melrose, Mass. (Conditioning.)
Freas Thermo Elec. Co., 1206 Grove, Irvington, N. J.
Gehnrich Indirect Heat Oven Co., Long Island City, N. Y
General Electric Co., Schenectady, N. Y.
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Heidbrink Co., 2633 Fourth Ave., S., Minneapolis, Minn
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Kenworthy, Chas. F., 198 Piedmont, Waterbury, Conn.
Lydon Bros., 229 Colden, Jersey City, N. J.
Maehler Co., Paul, 2210 Lake, Chicago, Ill.
Miho Co., 717 Sycamore, Cincinnati, O.
Sargent & Co., E. H., 155 E. Superior, Chicago, Ill.
Sioux Battery & Mfg. Co., Sioux City, Ia. (Battery.)
Standard Elec. Stove Co., Toledo, Ohio.
Steiner & Co., E. E., 197 E. Kinney St., Newark, N. J.
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Swartwout Co., 18522 Euclid Ave., Cleveland, O.
Thelco. See Freas Thermo Elec. Co.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
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OXIDES, Battery. See Chemicals, Battery.

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Federal Metallic Packing Co., Wakefield, Mass.
Holed-Tite Packing, Inc., 100 E. 42nd, New York, N. Y.
Packtite. See Federal Metallic Packing Co.

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KEY
Varnishes, Insulating ..... See V
Painting, Dipping, Spraying, Vacuum Impregnating.
Paint, Insulating and Acid Proof.. See P
Lacquer, Metal Finishing ..... See L

Acme White Lead & Color Wks., 8250 St. Aubin Ave., Detroit, Mich..... L
Ajax. See Sherwin-Williams Co.
Alaka. See Lacquer & Chemical Corp.
American Di-Electrics, Ltd., Hancock and Bodine, Long Island City, N. Y..... V
American Lastite Co., 3166 Lincoln Ave., Chicago.... P L
American Wurtzilite Co., Builders Bldg., Chicago .. P
Antakwa Co., 1329 Mohawk, Chicago, Ill..... P
Arizona Lacquer Mfg. Co., 7 16th, Brooklyn, N. Y.... L
Armlac. See Robertson Chemical Co.
Arolac. See Arizona Lacquer Mfg. Co.
Art-Craft. See Southwestern Paint & Varnish Co.
Atlantic Chemical Co., Coit, Irvington, N. J..... L
Atom Chemical Co., 96 E. 10th, New York, N. Y.... L
Bakelite Corp., 247 Park Ave., New York, N. Y.... L
Benolite Varnish Co., 501 Columbia Bank Bldg., Pittsburgh ..... V P
Berry Bros., Leib & Wight, Detroit, Mich..... V
Billings-Chapin Co., 1163 E. 40th, Cleveland, O.. V
Riwax Corp., 208 S. La Salle, Chicago, Ill..... P
Bradley-Hurtz Co., 2620 S. Dearborn, Chicago, Ill.... L
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Code 25. See Mitchell-Rand Mfg. Co.
Columbus Varnish Co., 264 Cozzeins, Columbus, O. V
Comulac. See Martindale Elec. Co.
Continental-Diamond Fibre Co., Bridgeport, Pa. V
Day & Co., James B., 1872 Clybourn Ave. Chicago, Ill..... P L
Doe & Co., Walter S., Kent, Ohio..... P
Dolph Co., John C., 168 Emmet, Newark, N. J.. V P
Duco. See Du Pont de Nemours & Co.
Du Pont de Nemours & Co., Wilmington, Del... P
Durex. See General Plastics.
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Eclipse Paint & Mfg. Co., Cleveland, O..... P
E. B. See Mitchell-Rand Mfg. Co.
Egyptian Lacquer Mfg. Co., 90 West, New York..... L
Electric Lacquer. See Dolph Co., John C.
Enamelac. See Robertson Chemical Co.
Ever-Brite Products Co., East Liverpool, O..... L
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Fesco. See Ferbert-Schorndorfer Co.
Five Point. See American Wurtzilite Co.
Franche & Co., 440 Orleans, Chicago, Ill..... L
General Elec. Co., Bridgeport, Conn..... V P
General Plastics, Inc., 1229 Walck Rd., N. Tonawanda, N. Y..... V
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Glyptal. See General Electric Co., Schenectady.
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Impervious Varnish Corp., 421 Wood, Pittsburgh. V P
Insulaterite. See Ohmlac Paint & Refining Co.
Insulvar. See Varflex Corp.
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Kodalak. See Eastman Kodak Co.
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Lackerite. See Twin City Shellac Co., Inc.
Lacquer & Chemical Corp., 214-40th St., Brooklyn, N. Y..... P L
Laqueroid. See Glidden Co.
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Lowe Bros. Co., 450 E. 3rd, Dayton, O..... V P
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Lucote. See Lucas & Co., John.
Maas & Waldstein, 435 Riverside Ave., Newark, N. J..... L
McDougall-Butler Co., Inc., Evans Water & Norton, Buffalo, N. Y..... V P
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Mawalac. See Maas & Waldstein.
Mecco. See Henry V. Walker Co.
Mica Insulator Co., 200 Varick St., New York.... V
M. I. C. See Mica Insulator Co.
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Nepto Lac. See Lowe Bros. Co.
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O'Brien Varnish Co., South Bend, Ind..... V P L
Ohmlac Refining Co., 140 S. Dearborn, Chicago, Ill. P
Opex. See Sherwin-Williams Co.
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Pedigree. See George Co., P. D.
Peninsular Paint & Varnish Co., Detroit, Mich.... L
Peerless. See Maas & Waldstein Co.
Proxlin. See Acme White Lead & Color Wks.
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S. P. C. See Ruberoid Co.
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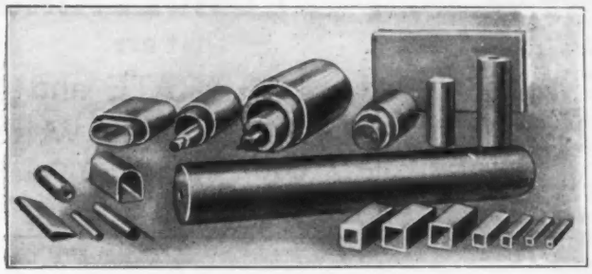

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Candles. See Candles, Fixture.
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Fibre. See Cloth and Paper.
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West Carrollton Parchment Co., West Carrollton, O.
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Standard Fibre Products Co., 36 Pleasant, Watertown, Mass.
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Gilbert Supply Co., Independence, Iowa.
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Vacuum Cleaner. See Brushes for Vacuum Cleaners

PINIONS. See Gears and Pinions.
PINION PULLERS. See Pullers, Armature Shaft.
PLASTICS. See Molded Insulation.
PLATES, Name. See Name Plates; Also Decalcomania
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Poloron Elec. Mfg. Co., 20 Bond, New York, N. Y.
Propp Co., M., 524 Broadway, New York.
Quick Catch. See Hubbell, Inc., Harvey.
Real. See Smith & Co., T. C.
Real Diamond. See Smith & Co., T. C.
Reben Electric Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y.
Reneo. See Reben Elec. Mfg. Co.
Reynolds Spring Co., Jackson, Mich.
Reynolite Masterpiece. See Reynolds Spring Co.
Ripple. See Bryant Elec. Co.
Rodale Mfg. Co., 200 Hudson, New York.
Safegard Elec. Appliance Co., 133 S. Twelfth, Philadelphia.
Samson Cutlery Co., 8 Jones, Rochester, N. Y.
Sears, Henry D., 80 Boylston, Boston 11, Mass.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Snapit. See Marks Products Co.
Snoco. See Snow & Co., E. W.
Snow & Co., E. W., Rochester, N. Y.
Spartanette. See Bryant Elec. Co.
Spar Tap. See Bryant Elec. Co.
Standard. See Cutler-Hammer Mfg. Co.
Suittail. See Beaver Mfg. Co.
Surefit. See Alcor Mfg. Co.
T. E. C. See Electric Co.
Tedco. See Paragon Elec. Sales Co.
Telltale Tap. See General Elec. Co.
Templus. See Bryant Elec. Co.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trio-Tap. See Rodale Mfg. Co.
Triple Tap. See General Elec. Co.
Twin Tap. See General Elec. Co.
United States Elec. Mfg. Co., 222 W. 14th, New York
Utilo Mfg. Co., 320 E. Liberty, Lancaster, Pa.
Weber. See Sears, Henry D.
Wellmade Elec. Mfg. Co., Torrington, Conn.
Wilshires. See Iona Co.
Yankee. See Beaver Mfg. Co.

POCKET METERS. See Instruments, Pocket.

POINTS, Contact
American Platinum Wks., 241 New Jersey Railroad Ave., Newark, N. J.
Baker & Co., Inc., 54 Austin, Newark, N. J. (Gold, Platinum, Silver.)
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J. (Platinum and Silver.)
Cohn, Sigmund, 44 Gold, New York, N. Y. (Platinum.)
Elkon, Inc. (Div. of P. R. Mallory Co.), 350 Madison Ave., New York, N. Y.
Fansteel Products Co., North Chicago, Ill.
General Plate Co., Attleboro, Mass.
Hardy Metal Corp., Seattle, Wash.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Interstate Products Corp., 29 Commercial, Newark, N. J. (Platinum and Silver.)
National Contact Co., 32 W. 60th, New York. (Platinum.)
Nisbet & Co., C. E., 230 W. Superior, Chicago. (Platinum.)
Spark-O-Metal. See Hardy Metal Corp.
Tungsten Electric Corp., 545 39th, Union City, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J. (Platinum and Silver.)

POLARITY INDICATORS. See Instruments, Pocket.
POLISHING MACHINES, WIRE. See Wire Polishing Machines.

PORCELAIN
Cement. See Cement, Liquid, Porcelain.
Insulators. See Porcelain.
Bushings. See Bushings, Box & Cabinet.
Liquid. See Cement, Liquid Porcelain.
Molding Machine. See Presses, Porcelain Molding.
Reflectors (Enameled). See Reflectors, Porcelain Enameled.
Refractory. See Cores, Resistance Coil.

PORCELAIN, Special Shapes
Akron Porcelain Co., Akron, Ohio.
American Porcelain Co., E. Liverpool, O.
A. P. See Akron Porcelain Co.
Burgess & Co., East Liverpool, O.
Central Porcelain Co., Columbiana, O.
Challenge Stamping & Porcelain Co., Grand Haven,, Mich.
Circle F Mfg. Co., Trenton, N. J.
Colonial Insulator Co., Akron, O.
Connecticut Porcelain Co., Trenton, N. J.
Cook Pottery Co., Trenton, N. J.
Corns China Co., Wellsville, O.
Crowley & Co., Henry L., 545 N. Arlington Ave., East Orange, N. J.
Electrical Refractories Co., East Palestine, O.
Globe Porcelain Co., Mulberry St. and St. Joes Ave., Trenton, N. J.
Hartford Faience Co., Hartford, Conn.
Hub-Way Mfg. Co., Hubbard, Ohio.
Illinois Electric Porcelain Co., Macomb, Ill.
Imperial Porcelain Wks., Canal and Mulberry, Trenton, N. J.
Knox Porcelain Corp., Knoxville, Tenn.
Louthan Mfg. Co., East Liverpool, O.
Mercer Porcelain Co., Trenton, N. J.
Metach Refractories Co., East Liverpool, Ohio
National Porcelain Co., Trenton, N. J.
New Jersey Porcelain Co., Trenton, N. J.
Nu Blac. See Star Porcelain Co.

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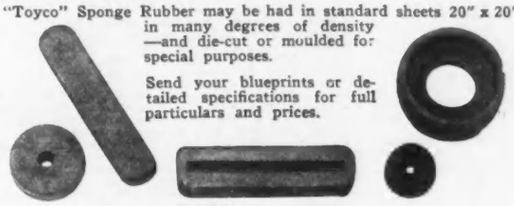

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Porcelava. See Burgess & Co.
Porcelain Products, Inc., Findlay, Ohio.
Square D Company, Detroit, Mich.
Standard & Specialty Porcelain Co., Sun Prairie, Wis
Star Porcelain Co., Muirhead St., Trenton, N. J
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thomas & Sons Co., R., Lisbon, O.
Trenle Porcelain Co., East Liverpool, Ohio.
Union Elec'l Porcelain Wks., Inc., Trenton, N. J.
Washington Porcelain Co., Washington, N. J.

POROUS CUPS

Unglazed earthenware cups for primary (wet) batteries
Colonial Insulator Co., Akron, Ohio.
Maddocks Sons, John, Trenton, N. J.
Ohio Pottery Co., Zanesville, Ohio.
Robinson Clay Products Co., Akron, Ohio.

POSTS, Binding

Binding Posts, Switch Parts, Stop Points, Contacts, Arms, Levers. See also Radio Mountings.
American Radio Hardware Co., 135 Grand, New York
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
DeJur-Amsco Corp., 418 Broome, New York, N. Y.
Eby Mfg. Co., Inc., H. H., 4710 Stenton Ave., Philadelphia, Pa.
Ensign. See Eby Mfg. Co., H. H.
Eureka. See Frank W. Morse Co.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros., Plano, Ill.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hoosick Falls Radio & Electrical Parts Mfg. Co., Hoosick Falls, N. Y.
King. See Morse Co., Frank W.
Morse Co., Frank W., 289 Congress, Boston (Spring Grip
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Polk, J. L., 41 Bell Ave., Troy, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Quality. See H. H. Eby Mfg. Co.
Queen. See Morse Co., Frank W.
Thomaston Mfg. Co., Thomaston, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.

POTENTIOMETERS (Instruments). See Instruments, Laboratory Standard.
POTENTIOMETERS (Radio Control). See Radio Receiver Parts.
POWDERED CARBON. See Carbon, Powdered.
POWER TRANSMISSION CHAIN. See Chain, Power Transmission.
PRESS BOARD. See Cloth and Paper.

PRESSES, Armature Coil

Comstock Mfg. Co., Wilkes-Barre, Pa.

PRESSES, ARMATURE NOTCHING. See Notching Machines, Armature.

PRESSES, Molded Insulation

Burroughs Co., 246 N. Tenth, Newark, N. J.
Dunning & Boschert Press Co., 329 W. Water, Syracuse
Elmes Engrg. Works, Chas. F., 220 N. Morgan, Chicago
Evans Engrg. Works, Chas. E., 1002 Fulton, Chicago, Ill
Farquhar Co., A. B., York, Pa.
French Oil Mill Machinery Co., Piqua, O.
Southwark Fdy. & Mach. Co., 400 Washington Ave., Philadelphia, Pa.
Stokes Mach. Co., F. J., 5834 Tabor Rd. (Olney), Philadelphia, Pa
Terkelson Machine Co., Boston, Mass.
Watson-Stillman Co., 75 West St., New York, N. Y
Wood & Co., R. D., Florence, N. J.

PRESSES, Porcelain Molding

Baird, Andrew, 2715 Newark, Detroit, Mich

PRESSES, Punching and Bending

Bench Presses—Power Presses; for Punching & Stamping Sheet Metal.
Ama Machine Co., Max, 101 Park Ave., New York, N. Y
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., 53rd St. & Second Ave., Brooklyn, N. Y
Federal Press Co., Elkhart, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Hyro Mfg. Co., 200 Varick, New York, N. Y.
Loshbough-Jordan Tool & Machine Co., Elkhart, Ind.
Niagara Machine & Tool Wks., 637 Northland, Buffalo.
Peck, Stow & Wilcox Co., Southington, Conn.

PRESSES, Stamping. See Presses, Punching & Bending.
Rockford Iron Works, 846 Ray, Rockford, Ill.

PRISMS, Chandelier. See Crystals, Chandelier
PROJECTOR LENSES. See Lenses.

PULLERS, Armature Shaft

Motor Pulley, Shaft & Pinion Pullers & Extractors
Allen Electric & Equipment Co., Kalamazoo, Mich.
Big Buster. See Premier Elec. Co.
Crane Puller Co., West Newton, Mass.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff Mfg. Company, Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts Philadelphia, Pa.
Little Giant. See Premier Elec. Co.
Peerless. See Electric Service Supplies Co.
Premier Electric Co., 3800 Ravenswood Ave., Chicago, Ill.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill

PULLEYS, Composition

General Electric Co., Schenectady, N. Y.
Rockwood Mfg. Co., Indianapolis, Ind.
Sprucolite Co., Bloomfield, N. J.

PUMPS, Oil Burner

Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Milwaukee Tank Wks., Milwaukee, Wis.
Monroe Machine Tool Co., 737 W. Jackson Blvd., Chicago
Reflex. See Simplex Oil Heating Co.
Simplex Oil Heating Co., 1199 Eddy, Providence, R. I.
Teesdale Mfg. Co., 427 Market, Grand Rapids, Mich.

PUMPS, Vacuum

To Exhaust Incandescent Lamps.
Beach-Russ Co., 50 Church, New York, N. Y.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Cenco. See Central Scientific Co.
Central Scientific Co., 460 E. Ohio, Chicago, Ill.
Dunham Co., C. A., 450 East Ohio, Chicago, Ill.
Eimer & Amend, 205 3rd Ave., New York, N. Y.
Elsler Elec. Corp., 756 S. 13th, Newark, N. J.
General Electric Co., Schenectady, N. Y.
Hubbard's Sons, Norman, 1 Carlton Ave., Brooklyn, N. Y.
Leiman Bros., 23 Walker, New York, N. Y.
Megavac. See Central Scientific Co.
Packard. See Hubbard's Sons, Norman.

PUNCHING PRESSES. See Presses, Punching.

PUNCHING and BENDING, Sheet Steel

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.

RACKS, Wire Reel

(With Tension Device Attached).
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning. See Mutual Foundry & Machine Co.

1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
4. Field Rheostats.
5. Laboratory Resistors and Rheostats.
6. Motor Starters and Controllers A. C. and D. C.
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8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

Chapman Elec'l Wks., P. E., 1820 Chouteau Ave., St. Louis Mo. (Tensionless Dereeler.
Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Elec. Co., Schenectady, N. Y. (Tension Indicator.)
Mutual Foundry & Machine Co., Atlanta, Georgia.
Segur. See Electric Service Supplies Co.

RADIO CIRCUIT COMPONENTS

This heading includes Inductances (Coils), Capacitors (Condensers), Fixed Resistances, Grid Leaks, Transformers, Choke Coils, and Filters, also Amplifier Units and Kits.
Acme Apparatus Co., 39 Osborne, Cambridge, Mass.
Acme Products Co., Boston, Mass.
Acme Wire Co., New Haven, Conn.
Aero-Call. See Aero Products, Inc.
Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Air-King Products Co., 216 Wallabout, Brooklyn, N. Y.
Ajax Elec. Specialty Co., St. Louis, Mo.
Akra-Ohm. See Shallcross Mfg. Co.
Alden Mfg. Co., Springfield, Mass.
All-American Mohawk Corp., 4201 Belmont Ave., Chicago
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Amerchoke. See American Transformer Co.
American Apparatus Co., Richmond, Ind.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
American Transformer Co., Newark, N. J
Amperite Rheostat. See Radiall Co.
Arco Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind
Arctic. See Premier Elec. Co.
Art Dial. See Pilot Radio & Tube Corp.
Audioformer Transformer. See Pacent Electric Co.
Autoformer. See Thordarson Elec. Mfg. Co.
Automatic Oil Heat Co., 9294 E. Fourth, St. Paul, Minn.
Automotive Parts Mfg. Co., 70 Washington St., Brooklyn.
B-Conomizer. See Pilot Radio & Tube Corp.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bonine. See Turn-it Radio Sales.
Branston Co., Chas. A., 297 Washington, Buffalo, N. Y
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn, N. Y.
Browning-Drake Corp., Calvary, Waltham, Mass.
Buffer. See Aerovox Wireless Corp.
Buffalo. See De Jur-Amsco Corp.
Camfield. See Columbia Metal Products Co.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Capacigrad. See Pilot Radio & Tube Corp.
Cardwell Mfg. Corp., Allen D., 81 Prospect, Brooklyn, N. Y.
Carter Mfg. Co., 6300 Euclid Blvd., East Cleveland, O.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill.
Central Radio Corp., Beloit, Wis.
Centraline. See Pilot Radio & Tube Corp.
Certified Condenser. See Radio Condenser Co.
Chelten Elec. Co., 4859 Stenton Ave., Philadelphia, Pa.
Clarostat Mfg. Co., 231 N. Sixth, Brooklyn, N. Y. (Radio Resistance.)
Cole Radio Mfg. Corp., 536 Bloomfield Ave., Bloomfield, N. J
Columbia Metal Products Co., 360 E. Grand Ave., Chicago.
Concertone. See Chicago-Jefferson Fuse.
Connectorlds. See Alden Mfg. Co.
Continental Carbon, Inc., Cleveland, O.
Continental. See Gardiner & Hepburn, Inc.
Cornell Elec. & Mfg. Co., Anable & Rawson, Long Island City, N. Y.
Cresradio Corp., 166-32 Jamaica Ave., Jamaica, N. Y.
Crefot. See Premier Elec. Co.
Cub. See Cornell Electric & Mfg. Co.
Daven Co., 158 Summit, Newark, N. J. (Kits)
Davohn. See Daven Co.
DeForest Radio Co., Jersey City, N. J.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
Diamond Weave Coil. See Sickles Co., F. W.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Dubilier Condenser Corp., 342 Madison av., New York
Dumont Elec. Co., 40 W. 17th, New York, N. Y.
Duratran. See Dubilier Condenser Corp.
Durham & Co., 1036 Market, Philadelphia, Pa.
Dynohmic See Lynch, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electrad, Inc., 173 Varick, New York, N. Y.
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill.
Electro Motive Engineering Corp., 127 W. 17th, New York
Elkay. See Langbein Kaufman Radio Co.
Elkon, Inc., 350 Madison Ave., New York, N. Y.
El Menco. See Electro Motive Engineering Co.
Equamatic Kit. See Karas Elec. Co.
Equitrol. See Cardwell Mfg. Corp.
E-Z. See Polymet Mfg. Corp.
Faradon. See Wireless Specialty Apparatus Co.
Fast Co., John E., 3932 Barry Ave., Chicago, Ill.
Ferranti, Inc., 130 W. 42nd, New York, N. Y.
Filatrol. See De Jur-Amsco Corp.
Filterettes. See Tobe Deutschmann Co.
Filtrola. See All-American Mohawk Corp.
Flechtheim Co., A. M., 136 Liberty, New York, N. Y.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind
Furnell Die Cast Condenser Corp., 16 Hudson, New York
F. & H. Radio Laboratories, Fargo, N. D.
Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.
General Instrument Corp., 225 Varick, New York, N. Y.
General Radio Co., 30 State, Cambridge, Mass

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General Winding Co., 214 Fulton, New York, N. Y.
Gen-Win. See General Winding Co.
Ger-Alt Radio Laboratories, 859 Flatbush Ave., Brooklyn, N. Y. (Adapter.)
Glastor. See Daven Co.
Globar Corp., Niagara Falls, N. Y.
Glo-Dial. See Wireless Radio Corp.
Gray & Danielson Mfg. Co., 260 1st, San Francisco, Cal.
Halldorsen Co., 4745 N. Western Ave., Chicago, Ill.
Hamilton-Sangamo Corp.
Hammarlund Mfg. Co., 424 W. 33rd, New York, N. Y.
Hardwick, Hindle, Inc., 122 Greenwich, New York, N. Y.
Harmonik. See Karas Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (TRF Kits.)
Heugebug Transformer. See Premier Elec. Co.
Heinemann Elec. Co., Trenton, N. J.
Held-Tite, Hi-ohm, Hi-pot. See Carter Radio Co.
Hi-Q Kit. See Hammarlund.
Hum-Dinger. See Clarostat Mfg. Co.
Hy-Wat. See Electro Motive Engineering Corp.
Igrad Condenser & Mfg. Co., 4322 Lake Ave., Rochester, N. Y.
Infra-Dyne. See Gray & Danielson Co.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa.
Isograd, Isoleak. See Pilot Radio & Tube Corp.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
J-M-P. Mfg. Co., 3329 Fond du Lac Ave., Milwaukee, Wis.
Karas Elec. Co., 4040 N. Rockwell, Chicago, Ill.
Kelford. See American Specialty Co.
Kenyon Transformer Co., 122 Cypress Ave., New York, N. Y.
Kilograd. See Pilot Radio & Tube Corp.
Kroblack. See Mountford, C. E.
Kuprox. See Kodel Radio Corp.
Langbein-Kaufman Radio Co., 62 Franklin, New Haven, Conn.
Lavite. See Aerovox Wireless Corp.
Lautz Mfg. Co., 245 N. J. B. R. Ave., Newark, N. J. (Radio Resistance).
Leakandenser. See Daven Co.
Lekeless. See Benjamin Elec. Mfg. Co.
Lemnis. See General Winding Co.
L. M. C. See Lautz Mfg. Co.
Loftin-White. See Hammarlund Mfg. Co.
Loless. See Wireless Radio Corp.
Lynch, Arthur H., 1775 Broadway, New York, N. Y.
Marco. See Martin-Copeland Co.
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Maxitran. See Electrical Research Laboratories.
Mayolian Corp., 1668 Webster Ave., New York, N. Y. (Tone Filter.)
Meggit. See Cole Mfg. Corp.
Melco-Supreme. See De Jur-Amsco Corp.
Melcoupler. See Robertson-Davis Co.
Meloformer. See Robertson-Davis Co.
Metaleak. See Dubilier Condenser Corp.
Metralign. See General Instrument Corp.
Micadon Condenser. See Dubilier Condenser Corp.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y. (Amplifier Kit.)
Mica-Static. See Dubilier Condenser Corp.
Micon Condenser. See Dubilier Condenser Corp.
Microcondenser. See Sterling Mfg. Co.
Microgrid. See Pilot Radio & Tube Corp.
Micrometric. See Karas Elec. Co.
Microstat. See Premier Elec. Co.
Midline. See Hammarlund Mfg. Co.
Modern Electric Mfg. Co., Toledo, O.
Mountford, C. E., 30 Sullivan, New York, N. Y.
Muter Co., Leslie F., 3440 S. Chicago Ave., Chicago, Ill. (Amplifier Kits.)
National Co., 61 Sherman St., Malden, Mass.
Neutro-Grad. See Pilot Radio & Tube Corp.
New York Coil Co., Mount Clare, Pa.
Nutmeg. See Hart & Hegeman Mfg. Co.
Ohio Carbon Co., 8215 Almira Ave., Cleveland, O.
Ohmite Mfg. Co., 642 N. Albany Ave., Chicago, Ill. (Resistance.)
One Way. See Carter Radio Co.
Orthometric. See Karas Elec. Co.
Orthophone. See De Jur-Amsco Corp.
Pacent Electric Co., 91 7th Ave., New York, N. Y.
Pam. See Samson Elec. Co.
Panatrol. See Wireless Radio Corp.
Parry Elec'l Resistor Corp., 280 New Main St., Yonkers, N. Y.
Phasatrol. See Electrad, Inc.
Philmore Mfg. Co., 106 7th Ave., New York, N. Y.
Piander. See De Jur-Amsco Corp.
Pierce Airo. See United Scientific Laboratories.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Pilotran. See Pilot Radio & Tube Corp.
Potter Mfg. Co., North Chicago, Ill.
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Power Box. See Scott Sales Co.
Powerohm. See International Resistance Co.
Powrad, Inc., 121 Ingraham, Brooklyn, N. Y.
Precision Coil Co., 122 Greenwich, New York, N. Y.
Precise Mfg. Corp., 254 Mill, Rochester, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill
Prestorad. See Alden Mfg. Co.
Pyrohm. See Aerovox Wireless Corp.
Radiall Co., 50 Franklin, New York, N. Y.
Radio Appliance Corp., Springfield, Mass.
Radio Condenser Co., Thorn & Copewood, Camden, N. J.
Radio Engrg. Laboratories, 100 Wilbur Ave., Long Island City, N. Y. (Short Wave Kit.)
Radioloc Switch. See Cutler-Hammer Mfg. Co.
Radio Receptor Co., 106 7th Ave., New York.
Radiostat. See Allen-Bradley Co.
Raola. See Modern Elec. Mfg. Co.
Rauland-Lyric. See All American Mohawk Corp.
Receptrad. See Radio Receptor Co.
Reesonator. See F. & H. Radio Laboratories.
Regal. See American Specialty Mfg. Co.
Reliable Parts Mfg. Co., Wellington, O.
Remler. See Gray & Danielson Co.
Resistaformer. See Aerovox Wireless Corp.
Resistograd. See Pilot Radio & Tube Corp.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent), Hatheway & Co., 16 Hudson, New York, N. Y.
Roberts Condenser. See Hammarlund Mfg. Co.
Robertson-Davis Co., 412 Orleans, Chicago, Ill.
Samson Elec. Co., Canton, Mass. (TRF Kits.)
Scovill Mfg. Co., Waterbury, Conn.
Senior. See All American Mohawk Corp.
Sensory. See Heinemann Electric Co.
Sevison Magneto Engr. Co., 397 Phillips, Toledo, O
Shallcross Mfg. Co., 700 Parker Ave., Collingdale, Pa.
Sickles Co., F. W., 130 Union, Springfield, Mass.
Signal Elec. Mfg. Co., Menominee, Mich.
Silver-Marshall, Inc., 6401 W. 65th St., Chicago. (Amplifier Kits.)
Silvertone. See Radio Receptor Co.
S. L. S. See Wireless Radio Corp.
S. L. T. See General Instrument Corp.
Somersolo. See DeForest Radio Co.
Splitmeter. See Premier Electric Co.
Sprague Specialties Co., Dept. M., Quincy, Mass.
Standard Transformer Co., Warren, O.
Sta-Put. See Martin-Copeland Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, O.
Stromberg-Carlson Tel. Mfg. Co., 1060 University Ave., Rochester, N. Y.
Submariner. See J-M-P Mfg. Co.
Super Multiformer. See Precise Mfg. Corp
Supertran Transformer. See Ford Radio & Mica Co.

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The Outstanding New Zinc for Die Castings

Greater tensile strength, a striking increase in machineability and a new conception of endurance in service—these are three of the remarkable characteristics of die casting alloys made with Bunker Hill 99.99% Zinc.

Ask your die casting manufacturer about Bunker Hill Zinc—he knows all about it.

FACTS—

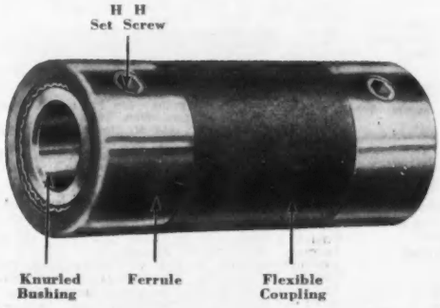
Bunker Hill Zinc Purity 99.99+%

- 10% Increased Tensile Strength (3-4-.1% Alloy)
- 10% Increased Brinell Hardness
- 100% Increased Elongation
- 50% Increased Impact Resistance
- 3-Times Longer Steam Test Life
- Greater Ductility—increased machine-ability.

ST. JOSEPH LEAD CO.

SALES OFFICES—250 PARK AVE., NEW YORK

Telephone Vanderbilt 6130



ONEIDA FLEXIBLE COUPLING

Takes waste motions out of your appliance

This link between power and machine is to oil burner, washing machine and other motor-driven appliances what the shock absorber is to the automobile. It swallows up the jolts and jumps of sudden overloads and instantly neutralizes power shaft vibrations.

Eliminates causes of most user complaints and adds definite ammunition to your selling talk.

Couple your product with a real improvement and greater user and dealer popularity. Give your machine Oneida Flexible Coupling.

DELBEE RUBBER CO.

Syracuse, New York

TEST the remarkable insulating qualities of these tubings on your own specific problems. Let us send you a try-out sample set of Turbo Oil Tubing.

Strong, flexible, easily cut and mounted, Turbo Oil Tubings keep electrical circuits entirely free from the menace of acids, vapors, gases and moisture. Doubly impregnated, its surfaces—inside and out—are glass-like in resistance and appearance. Comes in 36-in. lengths with inside diameters from ½ m/m to 13 m/m inclusive.

Also ask about our mica products, condenser paper and Turbo filling compounds.

We want you to have this sample set *of* TURBO OIL TUBING

WILLIAM BRAND & CO.

268 Fourth Ave., New York City

Chicago St. Louis Detroit San Francisco Los Angeles

RADIO CIRCUIT COMPONENTS—Continued
Symphony. See Modern Elec. Mfg. Co.
Synrodenser. See Precise Mfg. Corp.
Telemonic Coil. See Condenser Corp. of America.
Telos Coil. See Condenser Corp. of America.
Thomas Engineering & Mfg. Co., 616 S. Michigan Ave., Chicago, Ill.
Thompson-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thordarson Elec. Mfg. Co., Huron & Kingsbury Sts., Chicago
Tobe Deutschman Co., Canton, Mass.
Tone Control. See Sprague Specialties Co.
Torvid. See All American Mohawk Corp.
Transcontinental Coil Co., 5 Kirk Place, Newark, N. J.
Transcript-Clapp Kit. See Samson Electric Co.
Truphonic Amplification. See Alden Mfg. Co.
Tunadapta. See Lynch, Arthur H.
Tuway. See Carter Radio Co.
Twin-aud. See Peerless Radio Co.
Twin-Eight Transformers. See Bodine Electric Co.
Two-Ten & Two-Eleven. See Silver-Marshall.
Ultra Vario. See Bruno Radio Corp
Univernier Condenser. See Auburn Button Works.
Universal Electro Chemical Corp., 30 W. 15th, New York
Universal Winding Co., Boston, Mass.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Variall Condenser. See Muter Co.
Volta. See Universal Electro Chemical Corp.
Volumgrad. See Pilot Radio & Tube Corp.
Walbert Radio Corp., 1000 Fullerton Ave., Chicago, Ill.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.
Waterbury Button & Moulding Co., Waterbury, Conn.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn, N. Y.
Wireless Specialty Apparatus Co. (J. P.), Boston, Mass
RADIO HARDWARE. See Radio Mountings.

RADIO MOUNTINGS

Coil Mountings, Coil Sliders and Rods, Switches, Detectors, Detector and Grid Leak Mountings, Panel Brackets, Special Radio Hardware & Trimmings, Metal Dials, Metal Panels, etc.

Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Alden Mfg. Co., Brockton, Mass.
American Emblem Co., Utica, N. Y.
American Radio Hardware Co., 135 Grand, New York.
Bonza. See Haydon & Haydon.
Carborundum Co., Niagara Falls, N. Y. (Detector.)
Chapman Machine Co., Terryville, Conn.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
Durham & Co., 1936 Market, Philadelphia, Pa.
Electrad, Inc., 172 Varick, New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y (Metal Panels.)
Eureka. See Morse Co Frank W.
General Etching & Mfg. Co., 3072 West Grand Ave., Chicago, Ill. (Metal Panels & Escutcheons.)
Globe Technolien Corp., Reading, Mass.
Glodial. See Wireless Radio Corp.
Hart & Hegeman Mfg. Co., Hartford, Conn.
Haydon & Haydon, 167 Chambers, New York, N. Y.
Master Engineering Co., 122 S. Michigan Ave., Chicago, Ill.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Na-Ald. See Alden Mfg. Co.
Union Insulating Co., 296 Broadway, New York, N. Y.
Waddell Mfg. Co., Grand Rapids, Mich.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn.
Yaxley Mfg. Co., 9 S. Clinton, Chicago, Ill.
RADIO PANEL ENGRAVING. See Engraving, Radio Panel.

RADIO RECEIVER PARTS

Rheostats, Sockets, Plugs, Jacks.

Acme Elec. & Mfg. Co., 1652 Rockwell, Cleveland, Ohio.
Alden Mfg. Co., Springfield, Mass.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Amacostat. See American Apparatus Co.
American Apparatus Co., Richmond, Ind.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
Automotive Equipment Co., 317 Halsey, Newark, N. J
B. M. S. See Brooklyn Metal Stamping Corp.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. (Multiple Plugs.)
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Brach Mfg. Corp., L. S., 120 Sussex Ave., Newark, N. J.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn.
Cabelug. See Jones, Howard B.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill. (Also Sarkat Adapters.)
Central Radio Laboratories, 14 Keefe Ave., Milwaukee.
Centralab. See Central Radio Laboratories.
Clarostat Mfg. Co., 285 N. Sixth, Brooklyn, N. Y.
Cle-Ra-Tone. See Benjamin Elec. Mfg. Co.
D. A. Radio Co., 30 Hollister, Buffalo, N. Y.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
De Vrau See Stanley & Patterson
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Duostat. See De Jur-Amsco Corp.
Dynofilter Mfg. Co., 1022 E. 178th, New York, N. Y. (Interference Eliminator).
E-Z. See Polymet Mfg. Corp.
Eby Mfg. Co., H. H., 4710 Stenton Ave., Philadelphia, Pa
Electrad, Inc., 172 Varick, New York, N. Y
Fantail Plug. See Brooklyn Metal Stamping Corp.
Frost, Herbert H., 1142 W. Beardsley, Elkhart, Ind
Gem-Jac. See Frost, Herbert H.
General Instrument Corp., 225 Varick, New York, N Y
General Radio Co., 30 State, Cambridge, Mass.
Gray & Danielson Mfg. Co., 260 First, San Francisco, Cal
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Heinemann Elec. Co., Trenton, N. J.
Imp. See Carter Radio Co.
Jones, Howard B., 2300 Wabansia, Chicago. (Multiple Plug)
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Micrograd. See Pilot Radio & Tube Corp.
Modu-Plug. See Central Radio Lab.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Pacent Elec. Co., 91 Seventh Ave., New York, N. Y.
Pan-Tah-Tark. See Frost, Herbert H.
Philmore Mfg. Co., 106 Seventh Ave., New York, N. Y
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Premier Elec. Co., 8800 Ravenswood Ave., Chicago, Ill.
Recto Mfg. Co., 23 W. Third, Cincinnati, Ohio
Robertson-Davis Co., 861 W. Superior, Chicago, Ill.
Royalty See Electrad, Inc.
Samson Elec. Co., Canton, Mass.
Socostat. See D. A. Radio Co.
Stanley & Patterson, 150 Varick, New York, N. Y.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio
Tubestat. See Muter Co
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn
Workrite Radio Corp., 1838 E. 30th, Cleveland, O.
Yaxley Mfg. Co., 9 S. Clinton, Chicago, Ill.

RADIO RECTIFIER TUBES

Armstrong Electric Co., 187 Sylvan Ave., Newark, N. J
Arcturus Radio Tube Co., 260 Sherman Ave., Newark, N. J
Cable Radio Tube Corp., 80 N. Ninth, Brooklyn, N. Y.

Ceco Mfg. Co., 1200 Eddy, Providence, R. I.
Conneway Elec. Laboratories, 406 Jefferson, Hoboken, N. J.
Cunningham, Inc., E. T., 370 Seventh Ave., New York, N. Y.
Daven Co., 158 Summit, Newark, N. J.
DeForest Radio Co., Franklin St. & Central Ave., Jersey City, N. J.
Diamond Electric Co., Newark, N. J.
Diamond Vacuum Products Co., 4052 Diversey Ave., Chicago
Eveready Raytheon. See National Carbon Co.
Gold Seal Electrical Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hygrade Lamp Co., Salem, Mass.
Jaeger Research Laboratories, 280 Park Ave., Weehawken, N. J.
Ken-Rad Tube & Lamp Corp., Owensboro, Ky.
La Salle Radio Corp., Div. of Matchless Elec. Co., 1500 N. Ogden Ave., Chicago, Ill.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
National Carbon Co., New York, N. Y.
National Radio Mfg. Co., 1020 S. Central Park Ave., Chicago, Ill.
Neptron. See Hygrade Lamp Co.
Northern Mfg. Co., 367 Ogden, Newark, N. J.
Paramount Mfg. Co., 79 Orange, Newark, N. J.
Perryman Electric Co., 4901 Hudson Blvd., North Bergen, N. J.
Radio-Victor Corp. of America, 233 Broadway, New York.
Specialty Appliance Co., 6611 Euclid Ave., Cleveland, Ohio.
Sylvania Products Co., Emporium, Pa.
Televocal Corp., 588 Twelfth, West New York, N. J.
United Radio & Elec. Corp., 500 Chancellor Ave., Irvington, N. J.
RADIO TRANSFORMERS. See Radio Circuit Components
RADIO TUBE BASE BRANDERS. See Engraving Radio Panel.
RADIO TUBE BASES. See Radio Molded Parts.
RADIO TUBE BULBS (Unfinished). See Bulbs, Glass.

RADIO TUBE PARTS

Filament Hooks, Screens, Bolts & Nuts & Special Stampings.

Juno Fasteners, Inc., Hillside, N. J.
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J. (Screens).

RADIO WIRING HARNESS

Special wiring cable and harness assemblies for radio battery connections, radio tube adapter harness for converting battery operated receivers to A.C. operation; Socket Adapters for Power Tubes; Loud Speaker Extension Cords—This heading also includes auto ignition assemblies.

Afco. See American Fabric Co.
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
Alden Mfg. Co., Brockton, Mass. (Adapters.)
Alphus. See Alpha Wire Corp.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Alpstrand. See Alpha Wire Corp.
American Braiding Co., Holyoke, Mass.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Birnbach Radio Co., 254 W. 31st St., New York, N. Y.
Blue Ribbon. See Crescent Braid, Inc.
Brach Mfg. Co., L. S., Newark, N. J.
Connectoralds. See Alden Mfg. Co.
Cornish Wire Co., 30 Church, New York, N. Y
Corwico. See Cornish Wire Co.
Crescent Braid, Inc., Providence, R. I.
Crescent Insulated Wire & Cable Co., Trenton, N. J.
De Luxe, 50 W. Houston, New York, N. Y.
Diamond Braiding Mills, Chicago Heights, Ill.
Echo. See Cornish Wire Co.
Enterprise Mfg. Co., Third & Dauphin Sts., Philadelphia, Pa. (Adapters).
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind. (Adapters.)
Hatfield Rubber Wks., Inc., Hillside, N. J.
Lusterized. See American Braiding Co.
Manhattan Insulated Wire Co., 17 W. 60th St., New York.
Power, Inc., Harold J., Medford Hillside, Mass (Adapters).
Radio Receptor Co., 106 Seventh Ave., New York, N. Y. (Adapters.)
Riga. See Birnbach Radio Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio. (Adapters).
Wilkens Mfg. Co., 52 Orawaupon St., White Plains, N. Y.

RADIUM POWDER AND PAINT

Radium Dial Co., 3333 Forbes, Pittsburgh, Pa.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y.
RANGE SWITCHES, Rotary Snap. See Switches, Snap, Heavy Duty.
RAWHIDE GEARS. See Gears & Pinions, Rawhide.
READING LAMP BASES. See Bases, Reading Lamp.
REAMERS, Pipe. See Stocks, Dies and Reamers.
RECEPTACLES, Lamp. See Sockets and Receptacles.

RECEPTACLES, Plug, Heavy Duty

KEY

Battery Charging	See B
Floor Boxes	See F
Welding	See W
Machine Tool	See W
Watertight, Marine, Mine	See M
Car Trailer Connection	See C
Extension	See E

A. B. C. See Anderson Mfg. Co.
Adam Electric Co., Frank, St. Louis, Mo. F
Adapti Co., 2996 E. 72nd, Cleveland, O.. F
Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass. B W M C E
Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill. M
Arktite. See Crouse-Hinds Co.
Arnesen Electric Co., 13 Water, New York M
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.. F B W
Auth Electrical Specialty Co., 422 E. 53rd, New York, N. Y. E
Benjamin Elec. Mfg. Co., Des Plaines, Ill. F W M
Bryant Elec. Co., Bridgeport, Conn. (Also Range Type.) W
Campbell. See Steel City Elec. Co.
Cannon Elec. Development Co., 420 West Ave., 33, Los Angeles, Cal. F
C. E. M. Co. See Conn. Elec. Mfg. Co.
C. H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. M
Conduletto. See Crouse-Hinds Co.

Gage List of
Electrical Buyers
The Trade Authority

Connecticut Elec. Mfg. Co., Bridgeport, Conn. F
Cory & Son, Chas., 183 Varick, New York M
Crouse-Hinds Co., Syracuse, N. Y. B W
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. F
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa. C
Elwell Parker Elec. Co., 4222 St. Clair Ave., N. E., Cleveland, O. B
Fielding. See Stanley & Patterson.
Fountain's. See Jenkins Mfg. Co.
Fullman Mfg. Co., Latrobe, Pa. F
Fullman. See Steel City Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. B
Gleason & Co., J. L., 241 Franklin, Boston, Mass. E
H. & H. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. B W
Hazel Co., W. F., 76 Greenwich, New York, N. Y. W M E
Hubbell, Inc., Harvey, Bridgeport, Conn. (Also Range Type.) B W
Indestructible. See Kliegl Bros. Universal.
Jenkins Mfg. Co., Bloomfield, N. J. E
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. F B W M
Latrobe. See Fullman Mfg. Co.
Lexington Electric Products Co., 12 Chapel, Newark, N. J. C
Loeffelholz & Co., Milwaukee, Wis. C
Major Equipment Co., 4603 Fullerton Ave., Chicago, Ill. M
Neco. See Novelty Elec. Co.
NePage McKenny Co., Seven Front, Seattle, Wash. F
Novelty Elec. Co., Tenth & Cherry Sts., Philadelphia, Pa. C
Ohio Elec. & Controller Co., 5903 Maurice Ave., Cleveland, Ohio W
Ostrander Elecl. Works, W. R., 911 Atlantic Ave., Brooklyn, N. Y.
Preset. See Walker Bros. Co.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill. W M C E
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill. (Combination wall bracket and convenience outlet.)
Raleo Mfg. Co., 123 N. Albany Ave., Chicago, Ill.
Russell & Stoll Co., 53 Rose, New York F B W M E
Square D. Co., Detroit, Mich. W
Stanley & Patterson, 150 Varick, New York, N. Y. F
Steel City Elec. Co., Pittsburgh, Pa.. F E
Thomas & Betts Co., 15 Park Place, New York, N. Y. F
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa. M
Walker Bros., 12 E. 41st St., New York, N. Y. F E
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. F B W M
Yale. See Electric Products Co.
RECORDERS, Elapsed Time. See Indicators, Operation.
REDUCERS, Socket. See Socket Reducers.
REFLECTOR LENSES. See Lenses.

REFLECTORS, Porcelain Enameled, Steel

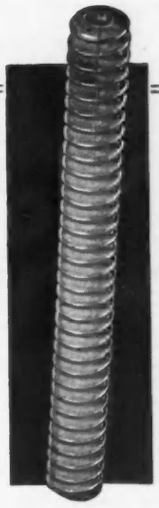
ABolite Reflector Co., 7506 Sherman Ave., Cleveland, O
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cello, Inc., 96 Prince, New York, N. Y.
Dunlap Co., John, Carnegie, Pa.
Durex. See Wheeler Reflector Co.
Federal Electric Co., 8700 S. State, Chicago, Ill.
Goodlites. See Goodrich Elec. Co.
Goodrich Elec. Co., 2301 N. Oakley Ave., Chicago, Ill.
Isolux. See Wheeler Reflector Co.
Jumbo. See Quadrangle Mfg. Co.
Marbelite Art Products Co., 140 N. Robey, Chicago, Ill.
Monk, H. E., 18 Warren, New York, N. Y.
Multi Elecl. Mfg. Co., 210 N. Ogden Ave., Chicago, Ill.
Oamed. See Overbaugh & Ayers.
Overbaugh & Ayers, 411 S. Clinton, Chicago, Ill.
Para Steel. See Wheeler Reflector Co.
Perfection. See Tindall & White.
Quad. See Quadrangle Mfg. Co.
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Sturdox. See Benjamin Elec. Mfg. Co.
Tindall & White, 35 W. 60th, New York, N. Y.
Vaporlux. See Wheeler Reflector Co.
Westinghouse Elec. & Mfg. Co., South Bend, Ind.
Wheeler Reflector Co., 275 Congress, Boston, Mass.
REFRIGERANTS. See Chemicals, Refrigeration.
REFRIGERATION CHEMICALS. See Chemicals, Refrigeration.

REFRIGERATOR CABINETS

Airtite. See Rhinelander Refrigerator Co.
Alaska Refrigerator Co., Muskegon, Mich.
American Refrigerator Corp., Peru, Ind.
Arlington Refrigerator Co., Arlington, Vt.
Athermos. See Gurney Refrigerator Co.
Baldwin Refrigerator Co., Burlington, Vt.
Banta Refrigerator Co., Clearfield, Pa.
Belding-Hall ElectrICE Corp., Belding, Mich
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bohn Refrigerator Co., St. Paul, Minn.
Cavalier. See Tennessee Furniture Co.
Champion Refrigerator Co., 206 Lexington Ave., New York.
Crystal Refrigerator Co., Fremont, Neb.
Crystecel. See Benjamin Elec. Mfg. Co.
Dry-Air. See Baldwin Refrigerator Co.
Dry-Cold. See Hill & Co.
Eddy & Sons Co., D., 836 Adams, Boston, Mass.
Erie Art Metal Co. & Erie Metal Furniture Co., Erie, Pa.
General Necessities Corp., General Necessities Bldg., Detroit, Mich.
Gibson Refrigerator Co., Greenville, Mich.
Gloekler Co., Bernard, 1627 Penn Ave., Pittsburgh, Pa.
Gurney Refrigerator Co., Fond du Lac, Wis.
Harder Refrigerator Corp., Cobleskill, N. Y.
Haskelite Mfg. Co., 120 S. La Salle, Chicago, Ill. (Knockdown.)
Heintz Mfg. Co., Front & Olney Aves., Philadelphia, Pa.
Heinz & Munschauer, Superior and Randall, Buffalo, N. Y.
Herrick Refrigerator Co., 1805 River, Waterloo, Iowa.
Hibbard Cabinets, Inc., 4524 Euclid Ave., Cleveland, O.
Hill & Co., C. V., 836 Pennington Ave., Trenton, N. J.
Holderle Bros., Inc., 339 Exchange, Rochester, N. Y.
Howe Scale Co., Rutland, Vt.
Jewett Refrigerator Co., Buffalo, N. Y
Kingston. See Lorillard Refrigerator Co
Kleen Kold. See Harder Refrigerator Corp.
Knox Products Co., Fourth & Greenhill Ave., Wilmington, Del.
Knox. See Erie Art Metal Co.
Leonard Refrigerator Co., Div. of Kelvinator Corp., Grand

Porcelava

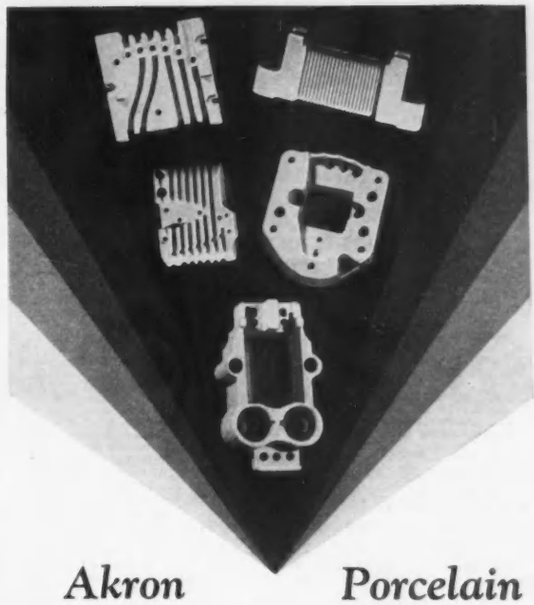
The best for Electric Heating Appliances



Our clay specialties, plain and threaded tubes, and Refractory Porcelain for Electric Heating Appliances are superior in every way; and "PORCELAVA" makes the best Pyrometer Insulation.

Burgess & Company
East Liverpool, Ohio
Factory at Wellsville, O.

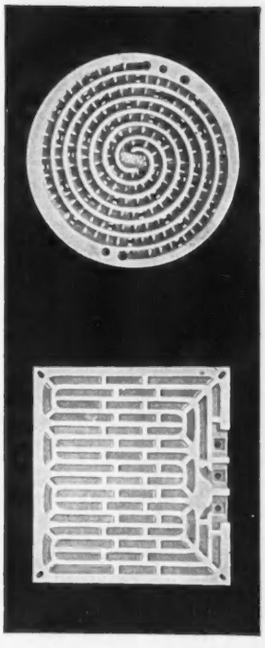
Chicago Representative:
F. D. FARNAM & CO.
549 No. Wells St., Chicago, Ill



Akron Porcelain

Well formed - - - Strong
Accurate - - - Good appearance
Reasonable Prices

THE AKRON PORCELAIN CO.
Akron, Ohio
Formerly the Mogadore Insulator Company



100%

in nature of quality and the kind of service they render...

The most convincing toast to the standing of our electrical refractories is tendered by the country's largest manufacturers, who continue to increase their orders for them.

Refractories, situated as they are at the point of great stress and exposure to breakdown and deterioration, need superlative quality of material, process and manufacture. Here, these three elements are standard. They insure foolproof refractories of long life.

It is commonplace for our products to withstand excessive heat smoothly. They never falter, spall or spit-off under continuous cooling. Their moulding is stout, smooth-edged and accurate.

Besides our complete line for electric ranges and other household appliances, and tubes and cores for all resistance windings, threaded or plain, we also make refractory heating element supports for electric furnaces. . . . Complete data at your request. THE ELECTRICAL REFRACTORIES COMPANY, East Palestine, Ohio.

ELECTRICAL REFRACTORIES

The Beacon

guiding you straight to porcelain satisfaction

Porcelain buying is not a gamble or a matter of guess work if you specify or insist upon geting STAR Quality. Star Porcelain is real quality and yet the price is as low as some inferior kinds. Let STAR Quality guide you

The STAR
PORCELAIN COMPANY
TRENTON NEW JERSEY

1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
4. Field Rheostats.
5. Laboratory Resistors and Rheostats.
6. Motor Starters and Controllers A. C. and D. C.
7. Radio Resistors and Rheostats.
8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

REFRIGERATOR CABINETS—Continued
Rapids, Mich.
Liver & Co., C. B., Omaha, Neb.
Loeber Co., Henry G., 151 E. 126th, New York, N. Y. (Ice Cream Cabinet.)
Lorillard Refrigerator Co., 40 Cooper Square, New York.
Louisville Refrigerator Corp., 4460 Louisville Ave., Louisville, Ky.
Louisville Tin & Stove Co., Louisville, Ky.
Mace & Co., L. H., 55 E. 150th, New York, N. Y.
Maine Mfg. Co., Nashua, N. H.
McCray Refrigerator Sales Corp., 2864 Lake St., Kendallville, Ind.
Mowatt Refrigerator Co., 25 Oak Grove, San Francisco, Cal.
Omaha Fixture & Supply Co., 11th and Douglas, Omaha, Nebr.
Oreole. See Ottenheimer Bros.
Ottenheimer Bros., Baltimore, Md.
Plymetl. See Haskelite Mfg. Co.
Reol. See Ottenheimer Bros.
Reolite. See Ottenheimer Bros.
Rex Mfg. Co., Connersville, Ind.
Rexdale. See Rex Mfg. Co.
Rhinelander Refrigerator Co., Rhinelander, Wis.
Sanitary Refrigerator Co., Fond du Lac, Wis.
Schmidt Co., C., John and Livingston, Cincinnati, O.
Seeger Refrigerator Co., St. Paul, Minn.
Sherer-Gillett Co., 661 W. Washington, Chicago, Ill.
Steeprest. See Helntz Mfg. Co.
Sumners Mfg. Co., Gloucester, Mass.
Tennessee Furniture Co., Chattanooga, Tenn.
Vogt. See General Necessities Corp.
Ward Refrigerator Co., 8901 S. Alameda, Los Angeles, Cal.
White Mountain. See Maine Mfg. Co.
White Seal. See Louisville Refrigerator Co.

REFRIGERATOR CONDENSER UNITS. See Condenser Units, Refrigerator.

REFRIGERATOR FITTINGS

Commonwealth Brass Corp., 5781 Commonwealth Ave., Detroit, Mich.

REGULATORS, Temperature

American Radiator Co., 1807 Elmwood Ave., Buffalo, N. Y. (Mercury Switch Type.)
American Teletherm Co., 1017 Summit, Toledo, O.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa. (Furnace.)
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Bazel Mfg. Co., 911 Mulberry, Kansas City, Mo.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Ceaco. See Cobb Electric Appliance Co.
Cobb Electric Appliance Co., 100 Massachusetts Ave., Boston.
Cook Elec. Co., 2700 Southport Ave., Chicago, Ill.
Davis & Daggett Co., 238 Dwight, Springfield, Mass.
D. & T. Manufacturing Co., 3001 La Salle, St. Louis, Mo.
Electric Automatic Appliance Co., Denver, Col.
Engelhart, Chas., 90 Chestnut, Newark, N. J.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gifford Heat Control Systems, 1 Broadway, New York.
Gold Car Htg. & Ltg. Co., 220 36th, Brooklyn, N. Y.
Hart Mfg. Co., Hartford, Conn.
Hermansen Elect. Co., 505 W. 41st, New York, N. Y.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Jewell Mfg. Co., Auburn, N. Y.
Johnson Service Co., 149 Michigan, Milwaukee, Wis.
Lockswitch. See Time-O-Stat Controls Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill. (Mercury Switch.)
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis, Minn.
Penn Electric Switch Co., Des Moines, Iowa.
Penn Heat Control Corp., 15 & Chestnut Sts., Philadelphia, Pa.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Protectostat. See Minneapolis-Honeywell.
Quick Freeze. See Penn Electric Switch Co.
Ranco. See Automatic Reclosing Circuit Breaker Co.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Simplex Heat Regulator, 2953 Pillsbury Ave., Minneapolis.
Snapoo. See Tagliabue Mfg. Co.
Souder-Hornsby Co., Tamaqua, Pa.
Sure Fire See Boston Machine Wks.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Time-O-Stat Controls Co., Cramblet Engineering Div., 286 Milwaukee Ave., Milwaukee, Wis.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Webster Elec. Co., Racine, Wis.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
Wilcolator Co., Newark, N. J.
Wilson-Maulelin Co., 383 Concord Ave., New York, N. Y

REGULATORS, Voltage

Rotor. See Ward-Leonard Electric Co.
States Co., 19 New Park Ave., Hartford, Conn.
Ward-Leonard Electric Co., 31 South, Mount Vernon, N. Y.

SCREW MACHINE PRODUCTS AND SPRINGS
for every purpose
WILLIAM STEINEN & COMPANY
297 Washington St. Newark, N. J.

Screw Machine Products
UP TO 2¼ in. DIAMETER
OLSON MFG. CO.
56 Commerical St.
WORCESTER, MASS.

RELAYS

(See also Circuit Breakers and Thermostats.)
American Instrument Co., 774 Girard, N. W., Washington, D. C.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Dunco. See Struthers Dunn, Inc.
General Electric Co., Schenectady, N. Y.
Leach Relay Co., 693 Mission, San Francisco, Cal.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Wilcolator Co., Newark, N. J.
REMOTE CONTROL SWITCHES. See Switches, Remote Control.

REMOVERS, Coil

Ewing Mfg. Company, Middleport, Ohio.

RESISTANCE

Boxes. See Instruments, Laboratory Standard
Coil Cores. See Cores, Resistance.
Test Sets. See Instruments
Units, Radio. See Radio Circuit Components.
Units. See Units, Rods & Grids.
Wire. See Wire Bare.

RESISTORS

Hardwick, Hindle, Inc., 122 Greenwich, New York, N. Y.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.
RESISTORS. See Units, Rods & Grids.
RESURFACERS, Commutator. See Stones, Commutator, also Tools, Commutator Truing.
REVOLUTION COUNTERS. See Tachometers.
RHEOSTATS,
Motor-Controlling. See Controllers, also Rheostats.
Radio. See Radio Receiver Parts.
Sewing Machine. See Controllers.

RHEOSTATS

	KEY
Battery Charging	See B
Stage Dimming	See D
Meter Testing (Laboratory)	See L
Plating Tank	See P
Motion Pictures (Projector Lamp)	See M
Motor Starting, Field and Speed Regulating	See F

	F	B	D	P	M	L
Allen-Bradley Co., 494 Reed, Milwaukee						L
Biddle, James G., 1211 Arch, Philadelphia						L
Brach Mfg. Corp., L. S., Newark, N. J. (Radio Battery Control.)		B				
Bradleystat. See Allen-Bradley Co.						
Columbia Electric Mfg. Co., 1292 E. 52nd, Cleveland, O.				P		
Controlite. See Ward Leonard Elec. Co.						
Crown Rheostat & Supply Co., 1908 Maypole Ave., West Chicago, Ill.				P		
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.	F	B	D			L
Economic Rheostat Switch Co., 3551 N. 5th, Philadelphia, Pa.	F					
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.	F					
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O.		B				
General Electric Co., Schenectady, N. Y.	F					L
Hanson-Van Winkle-Munning Co., Matawan, N. J.				P		
Holzmuller, C. J., 1108 Howard, San Francisco, Cal.			D			
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y.			D		M	
Knoeller Elec. Co., De Pere, Wis.	F					
National Elec. Controller Co., 5315 Ravenswood Ave., Chicago	F	B	D		M	L
Optimus. See Hanson-Van Winkle-Munning Co.						
Robertson, Leo F., Inc., 532 W. 22nd, New York, N. Y.					M	
Rubicon Co., 29 W. Sixth, Philadelphia						L
Schaefer Bros. Co., 1059 W. 11th, Chicago		B				
Simplicity. See Cutler-Hammer Mfg. Co.						
Union Elec. Mfg. Co., 934 Juneau Ave., Milwaukee, Wis.	F					
Universal. See Ward Leonard Elec. Co.						
Vitrohm. See Ward Leonard Elec. Co.						
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y.	F		D		M	
Watton. See Electric Products Co.						
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.	F					M

RINGS Seal. See Packing.

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automatic and hand
Screw Machine Products
also
ASSEMBLING
SOLDERING
HARDENING
PLATING
PARENT MACHINE & SCREW CO.
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ELECTRIC CONTROL APPARATUS
Vitrohm Resistors
vitreous enamelled for protection and long life.
Ribohm Resistors
for greatest watts in smallest space.
WARD LEONARD ELECTRIC CO.
31-41 *South St., Mount Vernon, N. Y.*

RIVETS

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Rivet & Specialty Co., 1836 S. 54th, Chicago, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hungerford Brass & Copper Co., Div. of The Chase Brass Companies, Inc., 84 Lafayette, New York, N. Y.
Manufacturers Belt Hook Co., 1315 W. Congress, Chicago, Ill.
Nelson Rivet Co., Taunton, Mass.
Stimpson Co., Edwin B., 70 Franklin Ave., Brooklyn, N. Y.
Thomson Mfg. Co., Judson L., Waltham, Mass.
Tubular Rivet & Stud Co., 87 Lincoln, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn.
Wright & Corson Mfg. Co., Bridgeport, Conn.
RODS, Resistance. See Units, Rods and Grids.
ROLLER BEARINGS. See Bearings, Ball and Roller.

ROLLS, Coil Flattening

Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
RUBBER BELTS. See Belts, Rubber.

RUBBER, Hard

Hard Rubber, Ebonite, Vulcanite.
Aetna Rubber Co., 815 E. 79th, Cleveland, O.
American Hard Rubber Co., 11 Mercer, New York, N. Y.
Connecticut Hard Rubber Co., West Raven, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Luzerne Rubber Co., Muirhead, near Dewey, Trenton, N. J.
Mahoganite. See American Hard Rubber Co.
New York Hard Rubber Turning Co., 212 Centre, New York.
Panelyte Corp., Trenton, N. J.
Radiolite. See Superior Hard Rubber Co.
Stokes Rubber Co., Trenton, N. J.
Superior Hard Rubber Co., Butler, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Vulcanized Rubber Co., 251 4th Ave., New York, N. Y.
Vulco Panels. See Vulcanized Rubber Co.

RUBBER, MECHANICAL GOODS

Goodrich Rubber Co., B. F., Akron, O.
Manhattan Rubber Mfg. Co., Passaic, N. J.
Republic Rubber Co., Youngstown, O.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sun Rubber Co., Barberton, O.
Toycraft Rubber Co., Dept. W., Ashland, O.
RUBBER, SEMI-HARD. See Rubber Mechanical Goods.

RUBBER, Sponge

Sun Rubber Co., Barberton, O.
Toycraft Rubber Co., Dept. W., Ashland, O.
RUBBER TAPE. See Tape, Rubber and Friction.
RUBBER TUBING. See Tubing, Rubber.
RUST PROOFING. See Plating & Finishing.
SAL AMMONIAC. See Chemicals, Battery.
SALTS, Battery. See Chemicals, Battery.
SATURATING TANKS. See Wire Manufacturing Machines.
SCREW SHELLS, Socket. See Shells, Screw Socket.

SCREW DRIVING MACHINES

Vim Electric Tool Co., 149 Broadway, New York, N. Y.

SCREW MACHINE PRODUCTS

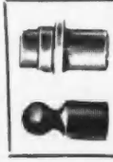
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa.
American Metal Wks., 4865 Stanton Ave., Philadelphia, Pa.
Barnes Co., Wallace, Bristol, Conn.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Brighton Screw & Mfg. Co., 1456 Harrison Ave., Cincinnati, O.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Colonial-Premier Co., 225 W. Ohio, Chicago, Ill.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Eureka Tool & Machine Co., Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Hanson, Elnar B., 17 Hermon, Worcester, Mass.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Indianapolis Screw Products Co., 621 N. Noble, Indianapolis.
Interstate Products Corp., 29 Commercial, Newark, N. J.
Linden & Co., 891 Broad, Providence, R. I.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Olsen Mfg. Co., 56 Commercial, Worcester, Mass.
Parent Machine & Screw Co., 50 Canal, Salem, Mass.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Shimer & Sons, Samuel J., Milton, Pa.
Steiner & Co., 297 Washington, Newark, N. J.
Thomaston Mfg. Co., Thomaston, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Wilmington Fibre Specialty Co., Wilmington, Del.

SCREWS, Cap (Cut Thread)

Bristol Co., Waterbury, Conn.
Hartford Machine Screw Co., Hartford, Conn.

SCREWS, Drive

Parker-Kalon Corp., 190 Varick, New York, N. Y.


SCREW MACHINE PRODUCTS
in Brass or Steel
Send us your specifications for an estimate.
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"By their SEALS Ye shall know them"

Buyers of electrical machinery are learning to scrutinize the packing before they buy. They have found that the only leak-proof packing is the Cooke Seal Ring, and that it is the only seal on the market which is non-wearing, almost frictionless, economical in first cost and in upkeep. Costs less to install, too. No wonder it is making old fashioned packing obsolete. You should have Cooke Rings on *your* product. Let us show you why.

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THE Automatic Heater

That Equipment Engineers Have Long Awaited

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An electric heater that heats process materials automatically . . . never overheats . . . requires no attention from workmen . . . a heater to meet the needs of modern high speed production.

Heated outlet prevents "freezing" before delivery to point of use. Multiple wired heating circuits are automatically switched on and off as needed to maintain a constant temperature. Foot operated needle valve permits accurate control of pouring operations.

Heats any material up to 450° F. Standard sizes from one quart to 50 gallons. Special sizes up to 100 gallons. New applications being made daily.

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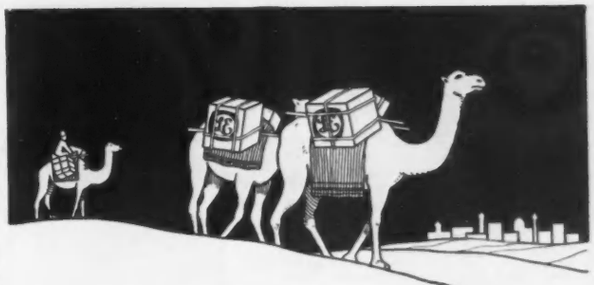
Sta-Warm
AUTOMATIC ELECTRIC HEATERS



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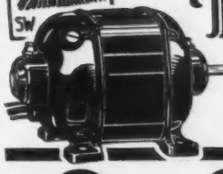
They say that scandal travels faster than virtue. Perhaps so. Be that as it may, the virtues of Leland Motors have traveled from the rocky shores of Maine to the balmy waters of San Diego Bay.

You find them down on the Spanish Main, on the sun-kissed shores of Spain, wherever electrical appliances are built and sold.

Leland's export business is no inconsiderable part of the Leland total although domestic sales have far surpassed all advance estimates.

May we suggest to all designers of appliances, and particularly to those who build the finest, that they inspect the Leland product and give it due consideration.

A. C. Single Phase Induction
D. C. Compound Wound
A. C. Polyphase
All in Interchangeable Frames



The Leland Electric Co.
Dayton, Ohio.
U. S. A.

Leland fractional horsepower Motors

SCREWS, Machine
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Clark Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., Rockford, Ill.
Hubbell, Inc., Harvey, Bridgeport, Conn.
New England Screw Co., Dept. A, 44 Farnsworth, Boston.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Strong, Carlisle & Hammond, 1392 W. Third, Cleveland, O.

SCREWS, Machine (Cut Thread)
American Screw Co., Providence, R. I.

SECOHMMETERS. See Instruments, Laboratory Standard.
SEGMENTS. See Discs, Armature.

SEPARATORS, Storage Battery
Campbell Elec. Co., Kansas City, Mo.
Carlile & Doughty, 2530 N. Broad, Philadelphia, Pa.
Chattanooga Battery Box Co., Chattanooga, Tenn.
Certified. See Ermet Products Co.
Ermet Products Co., Sherman Drive & 16th, Indianapolis, Ind. (Wood.)
Estes & Sons, E. B., 25 Vanderbilt Ave., New York. (Wood.)
Indianapolis Box & Separator Co., 1450 E. 19th St., Indianapolis, Ind. (Wood.)
Indianapolis Mfg. Co., Indianapolis, Ind.
Inseco. See Indianapolis Box & Separator Co.
Link & Hemrick, Inc., 555 W. 52nd, New York, N. Y.
Red Band. See Indianapolis Mfg. Co.
Stewart Mfg. Co., Wm. E., 14th & Elm, Flint, Mich. (Wood.)
Wick Lumber Co., R., 539 W. 52nd, New York. (Wood.)

SHADES
Aluminum. See Shades, Metallic.
Asbestos. See Shades, Fabric.
Bamboo. See Shades, Fabric.
Brass. See Shades, Metallic.
Cast Metal. See Shades and Domes.
Copper. See Shades Metallic.
Cretonne. See Shades, Fabric.
Leaded. See Shades and Domes.
Leather. See Shades, Fabric.
Linen. See Shades, Fabric.
Mica. See Shades, Mica.
Molded. See Molded Insulation.
Mosaic. See Shades and Domes.
Paper. See Shades, Fabric.
Parchment. See Shades, Fabric.
Silk. See Shades, Fabric.
Stamped Metal. See Shades, Metallic; also Shades and Domes.
Steel. See Shades, Metallic.
Tin. See Shades, Metallic.
Zinc. See Shades, Metallic.

SHADES, Fabric
Asbestos Cretonne, Leather, Linen, Paper, Silk, Bamboo. Parchment.
Acme Lamp Shade Co., 630 West Jackson Blvd., Chicago. (Silk.)
Adelphi Lamp Shade Co., 242 Fifth Ave., New York. (Silk.)
Admiration Lamp Shade Co., 150 Madison Ave., New York, N. Y. (Silk.)
Andrews Co., C. M., 32 E. 30th, New York, N. Y. (Silk.)
Art Lamp Shade Studios, 316 Fifth Ave., New York, N. Y.
Audrey Art Shade Studios, 105 Thatford Ave., Brooklyn.
Block & Co., L. D., 37 E. 18th St., New York, N. Y.
Borghese. See Hall, Chas.
Daiger Co., Charles V., 76 Essex, Boston, Mass. (Silk.)
Eastern Art Shop, 14 W. 19th, New York. (Parchment.)
Foss Parchment Shade Studio, 1338 E. 12th, Oakland, Cal. (Parchment.)
Fosilite. See Foss Parchment Shade Studio.
Frostelene. See Art Lamp Shade Studios.
Gibson Art Co., 223 W. Fourth, Cincinnati, Ohio. (Paper.)
Hall, Chas., 3 E. 40th, New York, N. Y. (Paper Parchment.)
Hanson Co., Paul, 15 E. 26th, New York, N. Y. (Chints.)
Harris Mfg. Co., 122 University Place, New York, N. Y. (Parchment.)
Herco Art Mfg. Co., Meriden, Conn.
Hoft Studio, 46 W. 21st, New York, N. Y. (Parchment.)
Idealite Elec. Lamp Shade Mfg. Co., 7 E. 17th, New York, N. Y. (Parchment.)
Kapa Shell. See Wardwell, E. H.
Kerwin. See Hall, Chas.
Kno-Glair. See Hamilton, M. E.
Lamb Bros. & Greene Corp., Napannee, Ind. (Silk.)
Luxrite. See John H. St. John.
Maxwell-Ray Co., Milwaukee, Wis. (Silk.)
Monarch Lamp & Shade Co., 210 N. Second, Philadelphia, Pa. (Silk.)
Morimura Bros., 58 W. 23rd, New York. (Bamboo, Silk, Cretonne.)
Parchment Novelty Co., 87 E. 10th, New York, N. Y. (Parchment.)
Patent Lamp Shade Co., 1361 Frankford Ave., Philadelphia.
Peerless Lamp Shade Mfg. Co., 114 E. 25th, N. Y. (Silk.)
R. D. Electric Co., Fort Wayne, Ind. (Linen and Silk.)
Reuter, Wm., 32 W. 34th, New York, N. Y. (Silk.)
Rindsberger Mfg. Corp., 18 E. 24th, Chicago, Ill.
Rosita Studio, 10 W. 28th, New York, N. Y. (Parchment and Leatherette.)
Sanderson's Art Co., Milwaukee, Wis. (Parchment.)
Springel & Son, A., 26 S. 3rd, Philadelphia, Pa.
St. John, John H., 1288 Atlantic Ave., Brooklyn, N. Y. (Silk.)
Straus-Hohenstein Co., 133 W. 21st, New York. (Silk.)
Superior Lamp Shade Manufacturers, 72 Madison Ave., New York, N. Y. (Silk.)
Tombs Studios, Wm. H., 172 Pennsylvania Ave., Newark, N. J. (Parchment Paper.)
Trio Mfg. Co., 610 N. American, Philadelphia, Pa. (Silk.)
Troy Art Studio, 624 2d Ave., Troy, N. Y.
Utility Shade Co., Tenafly, N. J.
Vogue Lamp & Shade Co., 130 W. 17th, New York, N. Y. (Parchment.)
Volkman & Co., 3223 W. Lake, Chicago, Ill.
Wardwell, E. H., 11 E. 36th, New York, N. Y.

SHADES AND DOMES
Leaded, Mosaic or Figured, Stamped or Cast Metal.
Art Shade Co., 224 N. Desplaines, Chicago, Ill.
Badanes Mfg. Co., 62 Greene, New York, N. Y.
Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y.
Mutual Sunset Lamp Co., 21 E. Houston, New York, N. Y.

Fair Haven Marble & Marbleized Slate Co.
Fair Haven Vermont
SLATE GOODS

PORTLAND-MONSON SLATE CO.
PORTLAND-MONSON SLATE CO. TRADE MARK PORTLAND, ME.
Quarriers of
Monson Slate
for Electrical Purposes, Natural Black, Oil Finish
Quarries:
Monson, Maine
Office, Portland, Maine

Western Art Glass Shade Works, 101 Turk, San Francisco.

SHADES, FACTORY WINDOW. See Window Shades, Factory.

SHADES, Metallic
Tin, Aluminum, Brass, Copper, Zinc, Steel.
A. A. Elec. Mfg. Co., Bridgeport, Conn. (Sole selling agent, Harry Pickhardt, 129 W. 15th, New York, N. Y.)
Durex. See Wheeler Reflector Co.
Faries Mfg. Co., Decatur, Ill. (Brass, Aluminum, Tin, Copper.)
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. (Aluminum, Brass, Zinc, Iron, Steel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Aluminum, Brass, Steel, Tin.)
Miller Co., Meriden, Conn.
Monk, H. E., 18 Warren, New York, N. Y. (Tin, Aluminum, Brass, Copper, Zinc & Steel).
Oameo. See Overbaugh & Ayres Mfg. Co.
Overbaugh & Ayres Mfg. Co., 411 S. Clinton, Chicago, Ill.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Western Reflector Co., 1221 W. Madison, Chicago. (Tin.)
Wheeler Reflector Co., 275 Congress, Boston, Mass.

SHADES, Mica
Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
Kant-Krack. See Huse Liberty Mica Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Tarmilite. See Tar Heel Mica Co.

SHAFT COUPLINGS. See Couplings, Shaft.
SHAFTS, Flexible. See Tubing, Flexible Metallic.
SHEARS, Metal Cutting. See Shears, Power.
SHEARS, Rotary. See Shears, Power.

SHEARS, Insulation
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.

SHEARS, Power
Niagara Machine & Tool Wks., 637 Northland, Buffalo, N. Y.

SHEET STEEL CABINETS. See Cabinets, Sheet Steel.

SHELLS, Screw Socket
Chase Brass & Copper Co., Waterbury, Conn.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass Inc., 820 Orleans, Chicago, Ill.
Patton-MacGuyer Co., Providence, R. I.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Torrington Mfg. Co., 70 Franklin, Torrington, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn. (Miniature.)

SHUNTS, Instruments. See Instruments, Laboratory Standard.
SIGN FLASHERS. See Flashers, Sign.
SIGN LETTER LENSES. See Lenses.

SILICA
Ottawa Silica Co., Ottawa, Ill. "Flint Shot."

SILK, Cloth Insulated. See Cloth & Paper.
Shades. See Shades, Fabric.
Tape. See Tape.
Thread. See Yarn, etc.

SILVER, Metal and Wire
Baker & Co., Inc., 54 Austin, Newark, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
Handy & Harman, 57 William, New York, N. Y.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., 97 Chestnut, Newark, N. J.

SILVER SOLDER. See Solder, Silver.
SINE WAVE OSCILLATORS. See Instruments, Laboratory Standard.
SIGN ELECTRODES, Gas. See Electrodes for Gas Signs.
SKINNERS WIRE. See Scrapers.
SLABS, Switchboard. See Asbestos Slabs; also Molded Insulation, Slate; Soapstone.

SLATE
For Switchboard Slabs and Barriers.
Davis Slate & Mfg. Co., 618 E. 40th, Chicago, Ill.
Electrical Specialties Corp., 50 Pearl, Boston, Mass.
Fair Haven Marble & Marbleized Slate Co., Fair Haven, Vt.
Penrhyn Slate Co., Hydeville, Vt.
Portland-Monson Slate Co., Portland, Me.
Structural Slate Co., Pen Argyl, Pa.

SLEEVE-BEARINGS. See Bearings and Bushings.
SLEEVING, Cotton. See Tape, Cotton.
SLOTTING FILES. See Files, Commutator Slotting.

SLOTTING MACHINES and TOOLS, Commutator
(Mica Undercutters).
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, Ohio.
Hullhorst Micro Tool Co., 3240 E. Monroe, Toledo, O.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Martindale Electric Co., 1262 W. Fourth, Cleveland, Ohio.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn
Peerless. See Electric Service Supplies Co.
Ransom & Randolph Co., Superior & Chestnut, Toledo, Ohio
Simplex. See Weidenhoff, Joseph.
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill
White Dental Mfg. Co., S. S., 152 W. 42nd, New York.

SNAP SWITCHES. See Switches, Snap

SOAPSTONE
For Switchboard Slabs and Barriers.
Alberene Stone Co., 153 W. 23rd, New York, N. Y.
Kirchberger & Co., Inc., 1425 37th, Brooklyn, N. Y.
Lin-Stun. See Westinghouse.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SOCKET LININGS. See Linings, Socket
SOCKET SHELLS. See Shells, Screw Socket.
SOCKETS, Flashing. See Flashers, Sign.

SOCKET Chain Attachments
Chain Links, Chain Adjusters, Acorns, Extensions, Insulated Chain Spliicers.
Abbott. See Harvey Hubbell, Inc.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bryant Electric Co., Bridgeport, Conn.
Duplex. See Warner Bros. Co.
Eade, John E., 104 Point, Providence, R. I. Links, Insulators.
Easylite. See Rittenhouse Co., A. E.
Economy. See Harvey Hubbell, Inc.
Flory, Wm. E., 38 W. 32nd, New York, N. Y. (Decorative Pull Chains.)
Gripper. See Wittenberg Bros.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Metal Pull Tassel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Links and Acorns. Metal Pull Tassels.)
Paiste. See Hart & Hegeman Mfg. Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y. (Pull Chain Tassel.)
P. & S. See Pass & Seymour, Inc.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Royal. See Sears, Henry D.
Scovil Mfg. Co., Waterbury, Conn. (Acorn.)
Sears, Henry D., 50 Boylston, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn. (Acorns.)
Weber. See Sears, Henry D.
Wittenberg Bros., 60 Shipman, Newark, N. J. Links. Insu-

SOCKET REDUCERS
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Con-del-lite. See Sears, Henry D.
Eagle Electric Mfg. Co., 79 Hall, New York, N. Y.
Electric Co., 94 Ailyn, Hartford, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart & Hegaman Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Propp Co., M., 524 Broadway, New York, N. Y.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sears, Henry D., 80 Boylston, Boston, Mass.

SOCKETS, Radio. See Radio Receiver Parts.

SOCKETS AND RECEPTACLES, Lamp
Bases other than Standard (or Medium) are indicated as follows: Mogul, M; Candelabra (or Miniature), C.

Key	See K
Composition	See W
Metal Shell	See B
Porcelain	See A
Pull Chain	See P
Push Through	See T
Sign Receptacles	See A

A. B. C. See Leviton Mfg. Co.
Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... A
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo. ..... W
Alabax. See Arrow Elec. Co.
Alcor Mfg. Co., 4605 W. Madison, Chicago, Ill. C
Appleton Electric Co., 1730 Wellington Ave., Chicago, Ill. ..... A
Armstrong & White, 9th and Liberty Ave., Pittsburgh, Pa. ..... A
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. M C K T P B A
Arrogrip. See Arrow Elec. Co.
A. & W. See General Outdoor Adv. Co.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. ..... C . . . P B .
Best. See United States Elec. Mfg. Corp.
Bryant Elec. Co., Bridgeport..... M C K T P B A
C-H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J.... M . . K T P B A
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. .....
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... M . . K T . . B A
Crouse-Hinds Co., Syracuse, N. Y... A W .....
Cutler-Hammer, Inc., 1287 St. Paul Ave., Milwaukee, Wis..... K T . . B A
Durex. See Wheeler Reflector Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn.
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. ..... P B . .
Far-Go Elec. Mfg. Co., 368 Broome, New York, N. Y. ..... C .....
Federal Electric Co., 8700 S. State, Chicago, Ill. ..... A
Flute. See Pass & Seymour.
Fluteller. See Pass & Seymour.
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. ..... M C . . . . . B . .
Gaynor Elec. Co., Stratford, Conn. ..... A
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... M C K T P B A
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... M C K T P B A
Hoosick Falls Radio & Elec'l Parts Mfg. Co., Hoosick Falls, N. Y..... W .....
Horan Co., E. S., 550 Monroe, Carlstadt, N. J. ..... A
Hubbell, Inc., Harvey, Bridgeport, Conn. M C K T P B A
H. & H. See Hart & Hegeman.
I-D-A. See Watson Mfg. Co., J. E.
K-E Cleat Receptacle. See Kirkman.
Kirkman Engineering Co., 1 Dominick, New York. (Cleat Receptacle.)..... A
Leader. See Leviton Mfg. Co.
Leiser & Co., W. A., 1607 Sansom, Philadelphia, Pa. ..... A

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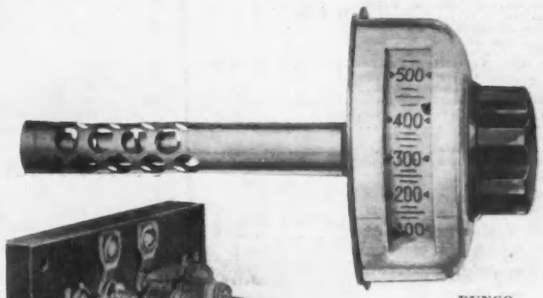

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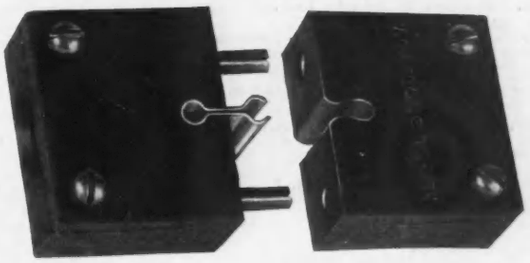

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Leviton Mfg. Co., 225 Newell, Brooklyn, N. Y. ..... M C K .. P B A
Levolier. See McGill Mfg. Co.
Liberty Bell. See Hart & Hegeman.
Locat-A-Catch. See Connecticut.
McGill Mfg. Co., Valparaiso, Ind. ..... P B A
Majestic Elec. Mfg. Co., 806 N. 12th, St. Louis. (Lamp Receptacle.) ..... A
Molded Socket Corp., Railroad, Pa. ..... K ..... A
Multi Elec'l Mfg. Co., 1840 W. 14th, Chicago, Ill. ..... A
Multilok. See Circle F Mfg. Co.
Newgard. See Multi Elec'l Mfg. Co.
New Wrinkle. See Bryant Elec.
Noark. See Colt's Patent Fire Arms.
One 4 All. See Propp Co., M.
P. & S. See Pass & Seymour.
Pass & Seymour, Solvay Station, Syracuse, N. Y. ..... M C K T P B A
Paulding, John I., New Bedford, Mass. ..... B A
Perkins. See Bryant Elec. Co.
Porcelain Products, Inc., Findlay, O. ..... A
Propp Co., M., 524 Broadway, New York, N. Y. ..... A
Quick Catch. See Hubbell, Inc.
Royal. See Sears, Henry D.
Ryan Appliance Co., 117 Mulberry, Trenton, N. J. ..... W ..... A
Safti Soc. See Maldeé Socket Corp.
Sears, Henry D., 80 Boylston, Boston M C K T P B A
Security. See Circle F Mfg. Co.
Shurlock. See Pass & Seymour.
Siemen Co., Bridgeport, Conn. ..... A
Tapiet Mfg. Co., 3709 Powelton Ave., Philadelphia, Pa. ..... A
Titan. See Bryant Elec. Co.
Trumbull Elec. Mfg. Co., Plainville, Conn. ..... A
Union Insul. Co., Parkersburg, W. Va. ..... A
United States Elec. Mfg. Corp., 322 W. 14th, New York, N. Y. ..... P .. B .. W
U. S. Electric Co., 311 Chambers St., Trenton, N. J. ..... A
Waleo. See Leiser & Co., W. A.
Waterbury Button & Moulding Co., Waterbury, Conn. ..... A
Watson Mfg. Co., 2 E., 550 N. Fifth, Philadelphia, Pa. (Concealed Fixture) ..... P B ..
Weber. See Sears, Henry D.
Wheeler Reflector Co., 275 Congress St., Boston, Mass. ..... P ...
Wood Electric Co., C. D., 565 Broadway, New York. (Sign Receptacles.) ..... A
Woodwin. See Wood Elec. Co.
Wrinklet. See Bryant Elec. Co.

SOLDER, Aluminum

Allen Co., Inc., L. B., 6750 Bryn Mawr Ave., Chicago, Ill.
Aluminum Solder Corp. of America, 730 Fifth Ave., New York, N. Y.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Platt Bros. & Co., Waterbury, Conn.
Solderlume. See Aluminum Solder Corp. of America.
Supreme. See Lasher-Weeber Co.
Union Smelting & Refining Co., Newark, N. J.
Usarco. See Union Smelting & Refining Co.

SOLDER, Bar and Wire

Eagle. See Hoyt Metal Co.
Genuine A. See Hoyt Metal Co.
Hoyt Metal Co., St. Louis, Mo.
National Bearing Metal Corp., Div. More-Jones Brass & Metal Co., 4936 Manchester Ave., St. Louis, Mo.

SOLDER, Self-Fluxing

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Solder & Flux Co., 2910 N. 16th, Philadelphia.
Dutch-Boy. See National Lead Co.
Gardiner Metal Co., 1368 W. Lake, Chicago, Ill.
Kester Solder Co., 4201 Wrightwood Ave., Chicago, Ill.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
National Lead Co., 111 Broadway, New York, N. Y.
Silva-Wares, Inc., 134 W. 26th St., New York, N. Y.
Solderall Co., 129 Sussex Ave., Newark, N. J.
Tinol. See American Solder & Flux Co.

SOLDER, Silver

Handy & Harman, 57 William, New York, N. Y.
Wilson Co., H. A., Newark, N. J.

SOLENOIDS. See Coils, Finished.

SOLDERING

Compounds. See Soldering Compounds.
Irons. See Soldering Irons.
Machines. See Soldering Machines, Commutator
Tools. See Torches and Furnaces.

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American Solder & Flux Co., 2910 N. 16th, Philadelphia, Pa Flux, Paste, Salts.
Amco. See American Solder & Flux Co.
Anchor. See Garden City Laboratory.
Benson Co., Alex B., Hudson, N. Y. (Salts and Paste.)
Burnley Battery & Mfg. Co., North East, Pa. Paste and Stick.
Brunner Chemical Wks., 217 E. 3rd, Cincinnati, O.
Callahan & Co., Geo., 218 Front, New York. (Fluid.)
Central Stamping Co., 206 Broadway, New York, N. Y. Paste and Salts.
Challenge. See Highland Electro Chemical Co.
Conductalute. See Technical Products Co.
Crescent. See McGill Mfg. Co.
Diamond. See Burnley Battery & Mfg. Co.
Dielectric Mfg. Co., St. Louis, Mo.
Dunton Co., M. W., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Eureka. See Grasselli Chemical Co.
Firth Radio Corp., 25 Beaver, New York, N. Y.
Fluxite. See Monarch Products Co.
Garden City Laboratory, 300 W. Adams, Chicago, Ill.
General Elec. Co., Bridgeport, Conn. (Paste).
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Highland Electro Chemical Mfg. Co., Connellsville, Pa (Paste, Stick, Salts.)

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Leveridge, Inc., Chas. W., 346 Fulton, New York, N. Y.
Luco. See Lukens Metal Co.
Lukens Metal Co., T. F., 1105 Fairmount Ave., Philadelphia, Pa.
McGill Mfg. Co., Valparaiso, Ind. Fluid.
Mitchell-Rand Mfg. Co., 19 Vesey, New York. (Paste.)
Monarch Products Co., Red Bank, N. J.
Neutral. See Dielectric Mfg. Co.
New-Ides. See Hartwig Co., Wm. J.
Nokorode. See Dunton Co., M. W.
Oakwood. See Weaver Specialty Co.
Paragon Insulating Co., 5716 Euclid Ave., Cleveland, O.
Perfecto. See Firth Radio Corp.
Pfanstiehl Chemical Co., Waukegan, Ill. Paste, Salts, Sticks, Fluid, Oil, and Solid Sal Ammoniac.
Queens. See Brunner Chemical Works.
Reade Mfg. Co., 133 Hoboken Ave., Jersey City, N. J. (Fluids, Salts, Paste).
Redens. See Reade Mfg. Co.
Red-Letter. See Ruby Chemical Co.
Rodale Mfg. Co., 300 Hudson, New York, N. Y. (Paste.)
Rolax Mfg. Co., 380 E. 133rd, New York, N. Y.
Ruby Chemical Co., Columbus, O.
Ruby Fluid. See Ruby Chemical Co.
Salbrick. See American Solder & Flux Co.
Snarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo. (Paste.)
Snowflake. See Grasselli Chemical Co.
Snowflake. See Highland Electro Chemical Co.
Solderine. See Central Stamping Co.
Solderite, Inc., 22 Green, Newark, N. J.
Speco. See Pfanstiehl Chemical Co.
Standard. See Grasselli Chemical Co.
Star. See McGill Mfg. Co.
Superior. See Highland Electro Chemical Co.
Technical Products Co., Pittsburgh, Pa. (Paste.)
Tinol. See American Solder & Flux Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago, Ill.
Weaver Specialty Co., 4344 Aurelia, Pittsburgh, Pa.
Yager's. See Benson Co., Alex. B.
Yankee. See Leveridge, Inc., Chas. W.

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Acme Elec. Heating Co., Dept. B, 1217 Washington, Boston
Adroit. See Adrola Corp.
Adrola Corp., Port Jefferson, N. Y.
American Beauty. See American Elecl. Heater Co.
American Elecl. Heater Co., Detroit, Mich.
B-D. See Bleadon-Dun Co.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beckwith Machine Co., 402 Chestnut, Ravenna, Ohio.
Betsy Ross. See Central Flatiron Mfg. Co.
Bleadon-Dun Co., 2300 Warren Ave., Chicago, Ill.
Brach Mfg. Corp., L. S., Newark, N. J.
Burnley Battery & Mfg. Co., North East, Pa.
Central Flatiron Mfg. Co., Johnson City, N. Y.
Chapman Machine Co., Terryville, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Davis Specialty Works, East Gary, Ind.
Dominion Elec'l Mfg. Co., 712 Ontario Ave., N., Minneapolis.
Dover Mfg. Co., Dover, O.
Drake Elec. Wks., 3943 Lincoln Ave., Chicago, Ill.
Edison Elec. Appliance Co., 5618 W. Taylor, Chicago, Ill.
Electrahot Mfg. Co., 525 S. 4th, Minneapolis, Minn.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland. (Transformer Soldering Outfit.)
Electric Soldering Iron Co., Inc., 135 W. 17th, New York.
Enco. See Electrical Necessities Corp.
Esico. See Electric Soldering Iron Co.
Everhot. See Swartzbaugh Mfg. Co.
Ever-Ready. See Gold Seal Elec. Co.
General Electric Co., Schenectady, N. Y.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Home. See Majestic Elec. Appliance Co.
Illinois Stamping & Mfg. Co., 220 N. Jefferson, Chicago, Ill.
Industrial. See Permway Mfg. Co.
Jiffy. See Koch & Co., Paul W.
Junior. See Drake Elec. Wks.
King. See Electric Heat Control Co.
Koch Co., Paul W., 23 S. Wells, Chicago. (Solder Dipper)
Landers, Frary & Clark, New Britain, Conn.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Lotan. See Simplex Flux & Solder Co. of America.
Lucifer. See Jones Point Tool & Elec. Co.
Majestic Electric Appliance Co., San Francisco, Cal.
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Mechanics. See Drake Elec. Wks.

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Queen Quality. See Watlow Elec. Mfg. Co.
Quick-Hot. See Moto-Ray Mfg. Co.
Radio. See Drake Elec. Wks.
Regular. See National Specialties Co.
Reliance. See Landers, Frary & Clark.
Samson Cutlery Co., 8 Jones St., Rochester, N. Y.
Silver King. See Illinois Stamping & Mfg. Co.
Simplex Flux & Solder Co. of America, 1965 E. 66th, Cleveland, O.
Superior Elec. Products Corp., 1300 S. 13th, St. Louis, Mo.
Swartzbaugh Mfg. Co., 1501 W. Bancroft, Toledo, O.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trent, Harold E., 295 N. Lawrence, Philadelphia, Pa.
Varick Elec. Mfg. Co., 28 E. 21st St., New York, N. Y.
Vulcan Elec. Heating Co., 225 Varick, New York, N. Y.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago, Ill.
Ward Mfg. Co., 937 Wellington Ave., Chicago, Ill.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo.
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(For production soldering of small commutators).
Allatonce. See Chapman Electric Works, P. E.
Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.

SOLENOIDS. See Coils

SOLVENTS & REDUCERS, VARNISH. See Paint, Varnish, Lacquer.

SPAGHETTI. See Tubing, Varnished Fabric.

SPEED CHANGING UNITS. See Gears (Speed Changing Units).

SPEED INDICATORS. See Tachometers.

SPOOLING MACHINES, WIRE. See Wire Manufacturing Machines.

SPRAYING OUTFITS

Airmode. See Reliable Mfg. Co.
Airway. See Binks Spray Equip. Co.
Atomister Corp., 21 Hamilton, Rahway, N. J.
Babco. See Simons Paint Spray Brush Co.
Beach Air Brush Co., Willard C., Harrison, N. J.
Binks Spray Equipment Co., 3120 Carroll Ave., Chicago, Ill.
Bruer Electric Mfg. Co., 852 Blackhawk, Chicago, Ill.
De Vilbiss Mfg. Co., 3750 Detroit Ave., Toledo, Ohio.
Eclipse Air Brush Co., 79 Orange, Newark, N. J.
Electric Sprayit Co., 320 E. Colfax Ave., South Bend, Ind.
Eureka Sprayers, Inc., 87-28 130th, Long Island City, N. Y.
Hurley. See Binks Mfg. Co.
Ideal Air Brush Mfg. Co., 270 Lafayette, New York, N. Y.
Kellogg Mfg. Co., 97 Humboldt, Rochester, N. Y.
Koch Bros. Mfg. Co., 2339 Nelson, Chicago, Ill.
K B. See Koch Bros. Mfg. Co.
Metal Specialties Mfg. Co., 338 N. Kedzie Ave., Chicago,
Macleod Co., 2232 Bogen, Cincinnati, O.
Paasche Air Brush Co., 1909 Diversey Parkway, Chicago, Ill.
Paint-O-Mister. See Atomister Corp.
Pioneer Air Compressor Co., 243 Canal, New York, N. Y.
Presto. See Metal Specialties Mfg. Co.
Reliable Mfg. Co., Dwightway & Fourth St., Berkeley, Cal.
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Simplex Spray Equipment Co., 552 W. Lake, Chicago, Ill.
Spray-All. See United States Air Compressor Co.
Sprayit. See Electric Sprayit Co.
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SPREADERS, COIL & LOOP. See Winding Machines Armature & Field Coil.

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Cook Spring Co., Ann Arbor, Mich.
Cuyahoga Spring Co., Berea Rd., Cleveland, O.
Dunbar Bros. Co., Bristol, Conn.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Gibson Co., Wm. D., 1800 Clybourn Ave., Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Lee Spring Co., 34 Main, Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge, Brooklyn, N. Y.
Hunter Pressed Steel Co., Landsdale, Pa.
Newcomb Spring Corp., 234 40th, Brooklyn, N. Y.
Peck Spring Co., Plainville, Conn.
Peterson Spring Co., 1660 Beard Ave., Detroit, Mich.
Rapid Spring Co., 222 Second Ave., Pittsburgh, Pa.
Raymond Mfg. Co., Corry, Pa.
Standard Spring and Manufacturing Co., 236-42nd St., Brooklyn, N. Y.
Steinen & Co., 297 Washington, Newark, N. J.
Young Industries, Inc., L. A., Detroit, Mich.

STAMPED BOXES. See Cabinets, Sheet Steel.

STAMPINGS, Fibre. See Fibre.
Sheet Metal. See Fixture Fittings.
Sheet Steel. See Stampings, Sheet Steel.
Small. See Stampings, Small.

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Bartlett-Thompson Co., 67 Sudbury, Boston, Mass.
Bossert Corp., 1002 Oswego St., Utica, N. Y.
Challenge Stamping & Porcelain Co., Grand Haven, Mich.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey, St. Paul & 15th, Milwaukee
Hubbard & Co., Pittsburgh, Pa.
Janney, Jr., Joseph A., 1421 Chestnut St., Philadelphia.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn.
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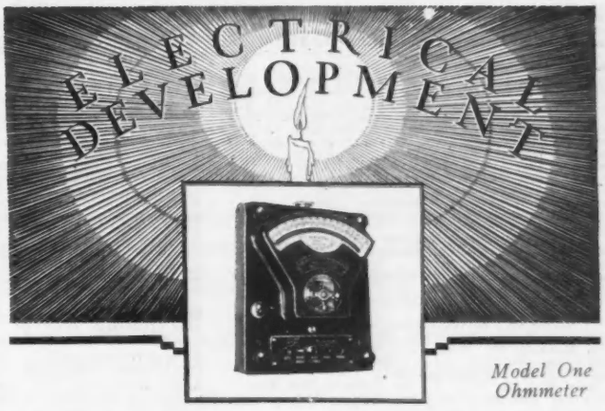

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United States Stamping Co., Moundsville, W. Va.

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American Radio Hardware Co., 135 Grand, New York, N. Y.
American Stamping Co., 978 E. 64th, Cleveland, O.
Arrow Automatic Products Corp., 27 Vestry, New York, N. Y.
Barnes Co., Wallace, Bristol, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Bull Dog Electric Products Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
Clarke Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., Rockford, Ill.
Eureka Tool & Machine Co., Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey, St. Paul & 10th, Milwaukee
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros. Co., Plano, Ill.
Hubbard Spring Co., M. O., Pontiac, Mich.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Imperial Electrical Co., Union City, Ind
Krischer's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Lansing Stamping Co., Lansing, Mich.
Lenz Metal Stamping Wks., J., 199 Franklin, New York.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Mechanics Tool & Stamping Co., 7 Summer, Worcester, Mass
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Mutual. See Bull Dog Elec. Products Co.
Patton-MacGuyer Co., Providence, R. I.
Paul & Beekman Mfg. Co., 1734 N. Fifth, Philadelphia, Pa.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Precision Metal Workers, 3100 Carroll Ave., Chicago, Ill.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Signal Elec. Mfg. Co., Menominee, Mich.
Sons Mfg. Co., Roselle, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
United Stamping & Mfg. Co., Cleveland, Ohio.
United States Stamping Co., Moundsville, W. Va.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.
Waterbury Mfg. Co., 226 Grand, Waterbury, Conn.
Waterbury Metal Ware Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.
Zierick Machine Wks., F. R., 68 E. 131st St., New York, N. Y.

STANDS, Armature

Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17 & Cambria Sts., Philadelphia, Pa.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.
STARTERS, Motor. See Controllers, Motor; Switches, Remote Control; Switches, Knife; Safety; Switches, Snap (Heavy Duty).
STEATITE. See Cores, Resistance Coil.
STEEL CASTINGS. See Castings, Steel.

STEEL for Electric Appliances

Elyria Iron & Steel Co., Elyria, O.
Ryerson & Son, Jos., 2558 W. 16th, Chicago, Ill.

STEEL, Magnet

Ajax Electrothermic Corp., Trenton, N. J.
Hercules Elec. Steel Corp., 145 Lafayette St., New York.
Indiana Steel Products Co., 4545 S. Western Ave., Chicago.
Ludlum Steel Co., Watervliet, N. Y.
Reed Co., Jr., David, 85 Adams, Brooklyn, N. Y.
Swedmag. See Reid Co., Jr., David.

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Agathon. See Central Alloy Steel Corp.
Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh.
Armco. See International Corp., Middletown, O.
Armelec. See Empire Steel Corp.
Central Alloy Steel Corp., Massillon, O.
Cyclops Steel Co., Titusville, Pa.
Dynelec. See Empire Steel Corp.
Empire Steel Corp., Mansfield, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Manelec. See Empire Steel Corp.
Metelec. See Empire Steel Corp.
Newport Rolling Mill Co., Newport, Ky.
Polelec. See Empire Steel Corp.
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Tranelec. See Empire Steel Corp.
Uniloy. See Universal Steel Co.
Universal Steel Co., Bridgeville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
STEEL, STRIP. See Strip Steel.

STOCKS, Dies and Reamers

Hall-Will, Inc., Twelfth & Cranberry, Erie, Pa.
Red-E-Hall. See Hall-Will, Inc.
Toledo Pipe Threading Machine Co., 1445 Summit, Toledo, O.

STONES, Commutator

Acme. See Green Equipment Corp.
Caro. See Electric Service Supplies Co.
Cleveland Stone Co., Union Trust Bldg., Cleveland, O.
Co-operative Utilities Co., 1503 Columbia Ave., Philadelphia, Pa.
Diamond Dee. See Co-operative Utilities Co.
Electric Service Supplies Co., 17th and Cambria, Philadelphia, Pa.
Green Equipment Corp., Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Lombard & Co., Somerville, Mass.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.

STOOLS, Factory; Steel

Angle Steel Stool Co., Plainwell, Mich.
Chicago Wire Chair Co., 613 N. La Salle, Chicago, Ill.
Royal Metal Mfg. Co., 1136 South Michigan Ave., Chicago.

STORAGE
Battery Plates. See Plates, Storage Battery.
Battery, Separators. See Separaters.
Tools. See Tools, Storage Battery.
STRAINING MACHINES, INSULATION. See Wire Manufacturing Machines.

STRAIGHTENERS, Armature Shaft

Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
STRANDING MACHINES. See Wire Manufacturing Machines.

STRIP STEEL

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Acme Steel Co., 2340 Archer Ave., Chicago, Ill. (Hot & Cold).
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. (Cold).
Athenia Steel Co., 135 William, New York, N. Y. (Cold.)
Barnes Co., Wallace, Bristol, Conn. (Hot.)
Central Alloy Steel Corp., Massillon, O. (Hot.)
Griffin Mfg. Co., Huron & Cherry, Erie, Pa. (Cold.)
Laclede Steel Co., 818 & Olive Sts., St. Louis, Mo. (Hot.)
Latrobe Electric Steel Co., Latrobe, Pa. (Hot & Cold.)
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa. (Hot.)
Stanley Wks., New Britain, Conn. (Hot & Cold.)
Steel and Tubes, Inc., Cleveland, O. (Hot & Cold.)
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa. (Hot & Cold.)
Thomas Steel Co., Warren, Ohio.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa. (Hot & Cold.)

STRIPPERS, Wire

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Artos Engineering Co., 115 Brown, Milwaukee, Wis. (Cutting, Stripping and Measuring).
Austin Co., M. B., 108 S. Desplaines, Chicago, Ill.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Dicke Tool Co., Downers Grove, Ill.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
E. Z. See Pyramid Products Co.
F. F. See France Mfg. Co.
France Mfg. Co., 10306 Berea Rd., Cleveland. (Motor Driven.)
Goehst. See Klein & Sons.
Hartman. See Service Sales & Mfg. Co.
Ideal Commutator Dresser Co., 1008 Park Ave., Sycamore, Ill.
Ives Mfg. Co., Meriden, Conn.
Klein & Sons, Mathias, Chicago, Ill.
Laubscher, A., 77 Fort Pleasant Ave., Springfield, Mass.
Perfection. See Weber Machine Corp.
Pyramid Products Co., 2311 S. State, Chicago, Ill.
Service Sales & Mfg. Co., 17005 Melgrave Ave., Cleveland, Ohio.
Speedcraft. See Wire Stripper Co.
Thomas Steel Products Co., Warren, Ohio.
Weber Machine Corp., 33 S. Water, Rochester, N. Y.
Wire Stripper Co., 507 Erie Bldg., Cleveland, O.
Zierick Machine Wks., F. R., 6 Howard, New York City. (Motor Driven Stripper & Twister).
SWITCHBOARD INSTRUMENTS. See Instruments, Portable and Switchboard.
SWITCHBOARD OPALS. See Lenses.
SWITCHBOARDS, SLABS AND BARRIERS
See Asbestos Slabs; Molded Insulation; Slate; Soapstone.
SWITCH (Switches).
Arms. See Posts, Binding.
"Across the Line" Type. See Controllers, Motor.
Baby Knife. See Switches, Battery.
Battery. See Switches, Battery.
Canopy. See Switches, Snap.
Clock Operated. See Switches, Time.
Feed Through. See Switches, Snap.
Fixture. See Switches, Snap.
Float. See Switches, Tank.
Flush. See Switches, Snap.
Handles. See Handles, Wood
Knife, Baby. See Switches, Battery & Baby Knife.
Lever Radio. See Radio Mounting.
Lever. See Switches, Snap, Lever.
Limit. See Controllers, Motor.
Mercury. See Switches, Mercury
Motor Starting. Magnetic Type. See Controllers.
Motor Starting. Non-Magnetic. See Switches, Motor Starting.
Pendant. See Switches, Snap.
Pressure Regulating. See Controllers.
Push Button, Snap. See Switches, Snap.
Push Button, Motor Starting. See Switches, Remote Control
Radio Receiver. See Radio Mountings.
Range. See Switches Snap; Heavy Duty
Remote Control. See Switches, Remote Control.
Reversing. See Controllers.
Rotary. See Switches, Snap.
Safety. See Switches, Knife.
Snap. See Switches, Snap.
Starter Type. See Controllers.
Storage Battery. See Switches, Storage Battery.
Surface. See Switches, Snap.
Tank. See Switches, Tank.
Time. See Switches, Time.
Toggle. See Switches, Snap.
Tumbler. See Switches, Snap.

SWITCHES, Battery and Baby Knife

Cut-Out Switches.
Anti-Wood. See Keil & Son, Francis.
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.
Bryant Electric Co., Bridgeport, Conn.
Chapman. See Frank W. Morse & Co.
Chicago Elec. Mfg. Co., 2801 S. Halsted, Chicago, Ill.
Jefferson Electric Co., 1503 S. Laflin, Chicago, Ill.
Circle T. See Trumbull Elec. Mfg. Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Crown. See Edwards & Co., Inc.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond E. See Hart Mfg. Co.
Edwards & Co., Inc., 140th & Exterior, New York, N. Y.
Electrad, Inc., 428 Broadway, New York, N. Y.
Eureka. See Frank W. Morse & Co.
Fahnestock Elec. Co., cor. East Ave. and 8th, Long Island City, N. Y.
Handy. See Chicago Elec. Mfg. Co.
H. & H. See Hart & Hegeman Div.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn. (Push Button.)
Harwood. See Frank W. Morse & Co.
Heinemann Elec. Co., Trenton, N. J.

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E. Machlett & Son
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Jost. See Frank W. Morse & Co.
Kappa. See Trumbull Elec. Mfg. Co.
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Kendrick & Davis Co., Lebanon, N. H.
Keystone. See Frank W. Morse & Co.
King Mfg. Co., B. C., 302 Park Ave., Brooklyn, N. Y.
Knox Porcelain Corp., Knoxville, Tenn.
K-P-F Elec. Co., 855 Howard St., San Francisco, Cal.
Kurz & Root, Appleton, Wis.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Lyons Mfg. Co. (Mt. Carmel), New Haven, Conn.
Majestic Elec. Mfg. Co., 80 N. 12th St., St. Louis, Mo.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
Morse Co., Frank W., Boston, Mass.
Partrick & Wilkins Co., Philadelphia, Pa.
Porcelain Products, Inc., Findlay, Ohio.
Powerlite Switchboard Mfg. Co., 4149 E. 79th, Cleveland, O.
Pullrite. See Frank W. Morse & Co.
Reliable Electric Co., 3145 Carroll Ave., Chicago, Ill.
Samson Electric Co., Canton, Mass.
Spero Elec. Mfg. Co., E. 33rd and Woodland Ave., Cleveland.
Sta-Rite. See Frank W. Morse & Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Wood Elec. Co., C. D., 565 Broadway, New York, N. Y.

SWITCHES, Mercury

(For Temperature Control Apparatus.)
Con-Tac-Tor. See Time-O-Stat Controls Co.
Cooper Hewitt Electric Co., 410 Eighth Ave., Hoboken, N. J.
Cramblet Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
General Kontroler Co., 200 E. First, Dayton, O.
Kon-nec-tor. See Cooper Hewitt Elec. Co.
Kontax. See General Kontroler Co.
Machlett & Son, 50 William, Long Island City, N. Y.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Time-O-Stat Controls Co., Elkhart, Ind.

SWITCHES, Motor Starting

Accessible. See Trumbull-Vanderpoel Elec. Mfg. Co.
Aces. See Colt's Patent Fire Arms Mfg. Co.
Adam Elec. Co., Frank, St. Louis, Mo.
Aurora Steel Products Co., Aurora, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Barber Elec. Mfg. Co., North Attleboro, Mass.
Bull Dog Electric Products Co., Detroit, Mich.
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Crouse-Hinds Co., Syracuse, N. Y.
E. W. See Trumbull Elec. Mfg. Co.
FA. See Adam Elec. Co., Frank.
F. A. Triumph. See Metropolitan Elec. Mfg. Co.
Federal Steel Products Co., 2 Ave. L., Newark, N. J.
Large-Dail Mfg. Co., 606 Cherry, Philadelphia, Pa.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O.
Lundy Co., E. A., Fulton Bldg., Pittsburgh.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Major. See Adam Elec. Co., Frank.
Mason. See Trumbull-Vanderpoel Elec. Mfg. Co.
Metropolitan Device Corp., 1250 Atlantic Ave., Brooklyn, N. Y.
Metropolitan Elec. Mfg. Co., Blvd. at 14th, Long Island City, N. Y.
Murray. See Metropolitan Device Corp.
Mutual. See Bull Dog Elec. Products Co.
Naro. See Metropolitan Elec. Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Nubiade. See Colt's Patent Fire Arms Mfg. Co.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Robbins & Myers, Inc., Springfield, O.
Safe-Lock. See Trumbull-Vanderpoel Elec. Mfg. Co.
Safelock. See Westinghouse Elec. & Mfg. Co.
Schmuckler & Sons, 2131 N. 28th, Philadelphia, Pa.
Square D Co., Detroit, Mich.
S. S. See Wadsworth Elec. Mfg. Co.
Tanner & Co., Wm. F., 511 Sharp, Baltimore, Md.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Trumbull-Vanderpoel Elec. Mfg. Co., Bantam, Conn.
T. V. Safelock. See Trumbull-Vanderpoel Elec.
Unisafti. See Metropolitan Device Corp.
Unit-Versal. See Bull Dog Elec. Products Co.
Universal Metal Box & Products Co.
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Westinghouse Elec. & Mfg. Co., Mansfield, O.

SWITCHES, Remote Control

Push Button, Magnetically Operated.
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Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Cutler-Hammer, Inc., 1287 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Valve Mfg. Co., 68 Murray, New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
H. P. See Palmer Elec. & Mfg. Co.
Industrial Controller Div. of Square D Co., Milwaukee, Wis.
Kato Engr. Co., Mankato, Minn.
Lincoln Elec. Co., Colt Rd. & Kirby Ave., Cleveland, O.
Major, F. A., System. See Adam Elec. Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Precise Mfg. Co., 254 Mill, Rochester, N. Y.
Protectoswitch. See Precise Mfg. Co.
R. C. C. See South Bend Current Controller Co.
Sauter. See Cramer & Co., R. W.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
South Bend Current Controller Co., South Bend Ind.
States Co., 19 New Park Ave., Hartford, Conn
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Takamine Corp., 208 Rawson St., Long Island City, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore.
Triplock. See Monitor Controller Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

SWITCHES, Snap

	KEY
Feed Through	See p
Fixture (Canopy, Candelabra and Key Arm)	See F
Flush	See f
Lever, Toggle, Tumbler	See L
Pendant	See p
Push Button	See P
Rotary	See R
Surface	See s

See Also Switches, Snap; Heavy Duty.
Adam Electric Co., Frank, St. Louis, Mo. ? . . . . . .
Anylite Elec. Co., Ft. Wayne, Ind. . . . . L . .

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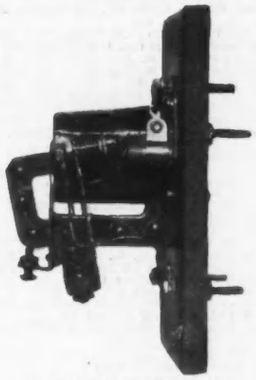

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NEWARK, L. L. Wilcox, Parkhurst St. at Avenue C.
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PITTSBURGH, Rutherfoord & Uptegraff, Clark Bldg.
ST. LOUIS, D. O. Stewart, 619 Bank of Commerce Bldg.
SAN FRANCISCO, Utilities Equipment Corp., 1644-A Russ Bldg.
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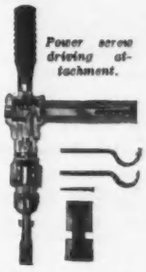

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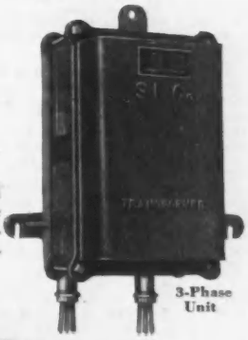

3-Phase Unit

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Arrow Head. See Arrow Elec.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. ..... f p P .... F
Best. See United States Elec. Mfg. Corp.
Brascolite. See Guth & Co., Edwin.
Bremer Elec. Mfg. Co., 139 N. 7th, Philadelphia, Pa. ..... f .....
Bridgeport Switch Co., 209 Center, Bridgeport, Conn. ..... L F
Bryant Elec. Co., Bridgeport, Conn..... f sp P R L F
B. S. Co. See Bridgeport Switch Co.
Carling Tool & Machine Co., 32 Union Place, Hartford, Conn..... F
Commercial. See Gaynor Electric Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... p P R L F
Crouse-Hinds Co., Syracuse, N. Y..... L ..
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. ..... P .... L ..
Diamond H. See Hart Mfg. Co.
Dugle. See Bryant Elec. Co.
Economy Fuse Mfg. Co., 2717 Greenview Ave., Chicago, Ill. ..... F
Gaynor Elec. Co., Stratford, Conn..... f ..... L .
General Elec. Co., Bridgeport, Conn..... f sp P R L F
Gio-Guide. See Bryant Elec. Co.
Gold Star Push Switch. See Hart & Hegeman.
Guth & Co., Edwin, 2615 Washington Ave., St. Louis, Mo. ..... F
Hart Mfg. Co., Hartford, Conn..... f sp P R L ..
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. (Door Bolt Control) f sp P R L F
Hart. See Hart & Hegeman.
H. & H. See Hart & Hegeman Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn.. sp .... L F
Jost. See Morse, Frank W.
Kell & Son, Francis, 401 E. 163rd, New York, N. Y. ..... f .. P .... F
Leviton Mfg. Co., 226 Newell, Brooklyn .... F
Levolier. See McGill Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind..... f ..... L F
Marks Products Co., 80 N. Ninth, Brooklyn, N. Y. ..... L F
Metropolitan Elec. Mfg. Co., Blvd at 14th St., Long Island City, N. Y..... s .. R ....
Morse Co., Frank W., 291 Congress, Boston .... P .....
National. See Standard Elec. Mfg. Co.
New England. See Paulding, John L.
Nutmeg. See Hubbell, Harvey, Inc.
Operite. See Morse Co., Frank W.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. ..... f sp P .. L F
Paulding, John L, New Bedford, Mass.... f s P .....
Pen Tap. See Beaver Mfg. Co.
Perkins. See Bryant Elec. Co.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y. ..... L ..
Pilotoggle. See Pilot Radio & Tube Corp.
Pilotoggle. See Pilot Elec. Mfg. Co.
Pullrite. See Morse, Frank W.
Rodale Mfg. Co., 200 Hudson, New York p .....
Sears, Henry D., 80 Boylston, Boston.. f sp P R L F
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa. ..... P .....
Snapit. See Marks Products Co.
Spartan. See Bryant Elec. Co.
Standard Elec. Mfg. Co., 941 Wrightwood Ave., Chicago, Ill..... f . P R L ..
Trigle. See Bryant Elec. Co.
Tumbolier. See Hart & Hegeman.
Twi-Lite. See McGill Mfg. Co.
United States Elec. Mfg. Corp., 222 W. 114th, New York, N. Y..... f .....
Victor. See Kell & Son, Francis.
Washington. See Gaynor Electric Co.
Weber. See Sears, Henry D.
Werkrite. See Morse, Frank W.
Yankee. See Bryant Elec. Co.

SWITCHES, Snap; Heavy Duty

Heavy duty rotary snap switches for Electric Range and Small Motor Control.

Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Bryant Electric Co., Bridgeport, Conn.
Diamond H. See Hart Mfg. Co.
Domestic Electric Co., 7723 St. Clair Ave., Cleveland, Ohio.
General Electric Co., Section W-234, Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.

SWITCHES, Storage Battery; Automatic Disconnecting

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Penn Electric Switch Co., Des Moines, Ia.
Radioloc. See Cutler-Hammer Mfg. Co.

SWITCHES, Tank

Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill
Blackburn-Smith Corp., 29 W. 45th, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Electrical Repair Co., 240 W. 25th, New York, N. Y.
General Electric Co., Schenectady, N. Y.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Leader-Trahern Products Co., Decatur, Ill.
Ostrander Elec. Wks., W. R., 911 Atlantic Ave., Brooklyn.
Penn Elec. Switch Co., 20th & Walnut, Des Moines, Ia.
Sundh Elec. Co., Parkhurst St. at Ave. C, Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Time (Automatic Clock Operated Switches)

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Astrachron. See Gem Engineering Co.
Automatic Elec. Heater Co., 1505 Race, Philadelphia, Pa.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Lighting Co., 831 Greenmount Ave., Baltimore.
Automatic Sprinkler Corp. of America, 910 B. of L. E. Bank Bldg., Cleveland, Ohio.
Automatic Timer Co., 1841 Euclid Ave., Cleveland, O.
Berry, A. Hall, 73 Murray, New York, N. Y.
Brown & Pengilly, Inc., 1264 Folsom, San Francisco, Cal
Buckeye Time Switches, Inc., 1557 St. Clair Ave., Cleveland, O.
Cackle. See Berry A. Hall.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Clark. See Automatic Heater Co.
Con-tac-tor. See Absolute Con-tac-tor Corp.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Eureka Tool & Machine Co., 49 Walnut, Newark, N. J.
Frisch, Walter P., 104 Linden, Rochester, N. Y.
Gem Engineering Co., Hempstead, N. Y.
General Electric Co., Schenectady, N. Y.
Go-N-Set. See G. & S. Research Lab.
G. & S. Research Laboratory, 1269 Cochran Ave., Los Angeles, Cal.

Hart Mfg. Co., Hartford, Conn.
Hartford. See Berry A. Hall.
Horni Signal Mfg. Co., 290 Hudson, New York, N. Y.
Jewel. See Time Switch Sales & Service.
Knowles, W. E., 2369 Broadway, Oakland, Cal.
Kwixset. See Thompson Clock Co.
Lamp-Lighter. See Robbins & Myers Co.
Liberty Bell Mfg. Co., Minerva, Ohio.
Mercury Time Switch Co., Marine City, Mich.
Northwestern Clock Co., Omaha, Neb.
Ohio Time Switch Co., 1439 St. Clair Ave., Cleveland.
Paragon Elec. Co., 409 S. Dearborn, Chicago, Ill.
Racine. See Reliance Automatic Ltg. Co.
Radio Owl, 2269 E. 51st, Los Angeles, Cal.
Radio Switchman. See R-V Mfg. Co.
Reliance Automatic Ltg. Co., 1925 Meade, Racine, Wis.
Research Mfg. Laboratory, 1269 Cochran Ave., Los Angeles.
Robbins & Myers Co., Springfield, O.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
R-V Mfg. Co., Marshfield, Mass.
Sauter. See Cramer & Co.
States Co., Hartford, Conn.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson Clock Co., H. C., Bristol, Conn.
Time Switch Sales & Service, 1841 Euclid Ave., Cleveland.
Tork Clocks, Inc., 12 E. 41st, New York, N. Y.
Walser Automatic Timer Co., 342 Madison Ave., New York.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

TACHOMETERS

Speed Indicators, Speedometers, Revolution Counters.

Biddle, James G., 1211 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Durant Mfg. Co., 655 Buffum, Milwaukee, Wis.
Electric Tachometer Corp., Spring Garden & Broad St., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Boston, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Misener Mfg. Co., 526 E. Washington, Syracuse, N. Y.
Productimeter. See Durant Mfg. Co.
Standico. See Stucht & Co.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Tenner Mfg. Co., 14 Sargeant, Hartford, Conn.
Weston Elecl. Instrument Co., 582 Frelinghuysen Ave., Newark, N. J.
Zerniekow Co., O., 15 Park Row, New York, N. Y.

TAGS, Cable; Pole and Battery

American Radio Hardware Co., 135 Grand, New York, N. Y. (Battery Lead Tags.)
Benedict Mfg. Co., East Syracuse, N. Y.
Brooklin Underground Elec'l Mfg. Co., Glenside, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
International Tag Co., 319 N. Whipple, Chicago, Ill.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Waterbury Button & Moulding Co. Waterbury, Conn.

TAGS, Shipping

Campbell Paper Box Co., South Bend, Ind.
International Tag Co., 319 W. Whipple, Chicago, Ill.

TAMPING TOOLS, COIL. See Tools, Commutator Truing.
TANK SWITCHES. See Switches, Tank.
TANKS, TINNING. See Wire Manufacturing Machines.

TAPE, Asbestos

American Asbestos Co., Norristown, Pa.
Asbestos Fibre Spinning Co., North Wales, Pa.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
General Asbestos & Rubber Co., Charleston, S. C.
Johns-Manville Corp., New York, N. Y.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Niagrite. See Johns-Manville, Inc.
Shield Brand. See Mitchell-Rand Mfg. Co.

TAPE, Cotton, Linen, Silk;

Tape, Sleeving, Webbing.

Alfalfa. See Burrell Belting Co.
Anchor Webbing Co., 300 Brook, Pawtucket, R. I. (Cotton, Silk).
Asbco. See Anchor Webbing Co.
Ermaline. See Burrell Belting Co.
Burrell Belting Co., 415 S. Hermitage Ave., Chicago, Ill.
Eagle. See Sidebotham, Inc., John.
General Electric Co., Schenectady, N. Y.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony) Philadelphia, Pa.
Hope Webbing Co., 1005 Main, Providence, R. I.
Krout & Fite Mfg. Co., Allegheny Ave. & Emerald Philadelphia, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sidebotham, Inc., John, 4317 Griscom, Philadelphia, Pa.
Smith Belting Co. (Germantown), Philadelphia, Pa.
Superfine. See Windsor Webbing Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Windsor Webbing Co., Pawtucket, R. I.
Worcester Braiding Co., 34 Southbridge, Worcester, Mass.

TAPE, Mica

Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Rubber and Friction

Ackerman. See Ackurate Rubber Co.
Ackurate Rubber Co., 25 Beaver St., New York, N. Y.
Adamson & Co., Joseph, Columbia and Germantown Aves Philadelphia, Pa.
Adhere. See Westinghouse Elec. & Mfg. Co.
Alpha. See Johns-Manville, Inc.
Amazon. See Graybar Elec. Co.
Appleton Rubber Co., Franklin, Mass.
Black Diamond. See Dunton Co., M. W.
Boston Woven Hose & Rubber Co., Boston, Mass.
Brooklyn. See Johns-Manville, Inc.
Bull-Dog. See Boston Woven Hose & Rubber Co.
Candee. See Ackurate Rubber Co.
Canfield Rubber Co., Bridgeport, Conn.
Canton. See Plymouth Rubber Co.
Clifton. See Clifton Mfg. Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston 30, Mass.
Competition. See New York Insulated Wire Co.
Double-Wear. See Dryden Rubber Co.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
Dundee, A. & B. See Okonite Co.
Dunton Co., M. W., 670 Eddy St., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Elkhart Rubber Wks., Elkhart, Ind.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y.
Grimshaw. See New York Insulated Wire Co.
Griptite. See Canfield Rubber Co.
Holfast Rubber Co., Atlanta, Ga.
Holditite. See United States Rubber Co.
Hydro-Proof. See Elkhart Rubber Wks.

Imperial Rubber Co., 220 Broadway, New York, N. Y.
Impervo. See Canfield Rubber Co.
Irco. See Imperial Rubber Co.
Johns-Manville Corp., New York, N. Y.
Jomanco. See Johns-Manville, Inc.
Kerite Ins. Wire & Cable Co., 30 Church, New York, N. Y.
Manson. See Okonite Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New York Insulated Wire Co., 114 Liberty, New York, N. Y.
Okonite Co., Passaic, N. J.
O. K. See Appleton Rubber Co.
P. & B. See Ruberoid Co.
Paratex. See Appleton Rubber Co.
Paruco. See Passaic Rubber Co.
Passaic Rubber Co., Clifton, N. J.
Plymouth Rubber Co., 1400 Revere, Canton, Mass.
Red-X. St. Louis Rubber Cement Co.
Rello. See United States Rubber Co.
Ruberoid Co., 95 Madison Ave., New York, N. Y.
S. I. See Superior Insulating Tape Co.
Sliteo. See Superior Insulation Tape Co.
Slipknot. See Plymouth Rubber Co.
Star. See Sullivan & Sons Mfg. Co., J.
Sticka. See Graybar Elec. Co.
Stixwell. See Clifton Mfg. Co.
Sullivan & Sons Mfg. Co., J., 2224 N. 9th, Philadelphia, Pa.
Superior Insulating Tape Co., 3044 Lambdin Ave., St. Louis.
2-Plex. See Holfast Rubber Co.
U. S. See United States Rubber Co.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Usco. See United States Rubber Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago.
Victor. See Graybar Elec. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Varnished Fabric

Acme Wire Co., New Haven, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Irvington Varnish & Insulator Co., Irvington, N. J.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New Jersey Wood Finishing Co., Woodbridge, N. J.
Radiotape. See Respro, Inc.
Respro, Inc., Wellington Ave. (Auburn), Providence, R. I.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sico. See Standard Insulator Co.
Standard Insulation Co., East Rutherford, N. J.
Voltape. See Respro, Inc.

TAPING MACHINES, Coil

Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Griswold Machine Co., George, New Haven, Conn.
Ridlon Company, Frank, Boston, Mass.
Segur. See Electric Service Supplies Co.

TAPING MACHINES, Wire

American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Wire Machinery Corp. of Am., New Haven, Conn.

TAPS. See Stocks, Dies and Reamers.
TENSION DEVICES, Coil Wire. See Racks, Wire Reel.

TENSION MACHINES, Band Wire

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.

TERMINALS AND CONNECTORS

Low Tension, Secondary Terminals and Connectors.

All-in-One. See Ohio Parts Co.
Barey-Nicholson Co., 2801 Fort, W., Detroit, Mich.
Bassett Metal Goods Co., Derby, Conn. (General Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Burton-Rogers Co., Boston, Mass.
Cabelug. See Jones, Howard B.
Clark Metal Products, 490 Hancock Ave., Bridgeport.
Dixie Supply Co., 91 7th Ave., New York.
Double Grip. See Pons, Eugene
Eagle Elec. Mfg. Co., 59 Hall, Brooklyn, N. Y.
Electron. See Bassett Metal Goods Co.
Fanestock Elec. Co., East Ave. and 8th, Long Island City, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Ideal Clamp Mfg. Co., 198 Bradford, Brooklyn, N. Y.
Jones, Howard B., 2226 Wabansia, Chicago, Ill.
K. E. M. See Kulier Elec. Mfg. Co.
Kulier Elec. Mfg. Co., 575 Pierce Ave., Long Island City
Morse Co., Frank W., Boston, Mass.
Nu-Way Snap. See Hatheway Mfg. Co.
Ohio Parts Co., 3361 Colerain Ave., Cincinnati, O.
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa.
Patton-MacGuyer Co., Providence, R. I.
Pons, Eugene, 927 Campbell Ave., Schenectady, N. Y.
Peterson Co., 7 Beverly, Providence, R. I.
Rajah Co., Bloomfield, N. J.
Salem Elec'l Supply Co., Salem, Mass.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Shure. See Burton-Rogers Co.
Tinkerbox. See Weber Elec. Wks.
Waterbury Button & Moulding Co., Waterbury, Conn.
Weber Elec. Wks., Brooklyn Sts., Cleveland, O.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.
Zierick Machine Wks., F. R., 6 Howard, New York.

TEST BENCHES, Armature

Allen Electric & Equipment Co., Kalamazoo, Michigan.
Burton & Rogers Co., Boston, Mass.
Cowie Electric Co., E. S., 1816 McGee, Kansas City, Mo.
Electric Machine Corp., 529 S. N. J., Indianapolis, Ind.
Hobart Bros. Co., Troy, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Mibo Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., Rochester, N. Y.
Pence & Son, H. O., San Luis Obispo, Cal.
Weidenhoff, Joseph, 4352 W. Roosevelt Road, Chicago, Ill.

TESTING INSTRUMENTS. See Instruments.

TESTERS, Coil

(Includes Armature Growlers, trouble shooters, and other portable testing devices). See also Instruments

Ace. See Weidenhoff, Joseph.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Ankenbrandt, J. J., 2140 Wakeman, Toledo, Ohio.
Armeter. See Chapman Electric Works, P. E.
Bartlett Electric Products Co., Goshen, Ind. (Storage Battery).
Batt-O-Meter. See Indiana Mfg. & Elec. Co., also Case Elec.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Case Elec. Co., Marion, Ind.
Century Electrical Co., 102 Randall Ave., Syracuse, N. Y.
Chapman Elec'l Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Columbia. See Weidenhoff, Joseph.
Comparometer Co., New Ulm, Minn.
Cowie Electric Co., E. S., 1816 McGee, Kansas City, Mo.
Economy. See Weidenhoff, Joseph.

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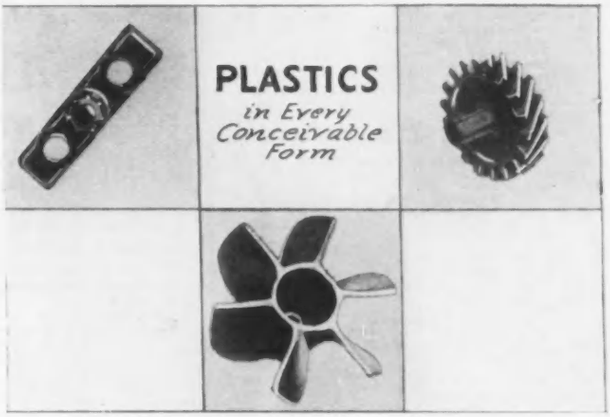
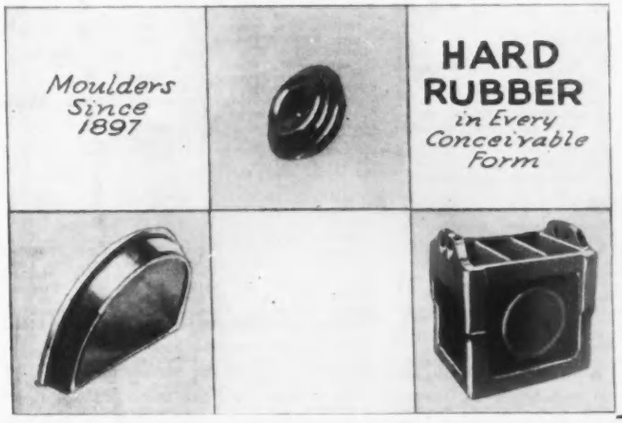
Whatever your needs for moulded insulation, parts for electrical appliances or radio apparatus, Hard Rubber can fill them. Electrical manufacturers now using Stokes' products find them safe and sure in operation and economical in use. Send us a sample part or drawing and we will be glad to quote you on any amount you require.





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Canadian Plant, Welland, Ontario.

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Red *Purple*
Green *Brown*
Slate *Pink*
Blue *White*
Yellow *Black*
Orange *Gray*

Whether rubber-covered Hookup Wire, Parallel or Twisted Cord, Saturated Push-Back Wire or Hatfield "Color-X" Cord Sets and Harnesses, you can choose your colors from an almost rainbow variety.

All colorings are sharp, unfading, instantly identified. They make trouble shooting, tracing and sure connections simple, easy, quick.

The two large plants of the Hatfield Rubber Works are equipped to give you extraordinary manufacturing and delivery service. Volume order or small fill-in, you get the wire when you want it, exactly as you want it at unvarying price economy.

Exhaustively complete lines are also carried in fixture wires, lamp cords, heater cords, automotive wires, lead-covered cables, flame-proof wires and all rubber Portable Cords.

Samples quickly sent at your request. Indicate the type of wire required.

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TESTERS, Coil—Continued
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland.
Electric Machine Corp., 529 S. N. J., Indianapolis, Ind.
Electrotest. See Comparometer Company.
Elmco. See Electric Machine Corp.
Ev-Ri-Test. See Weidenhoff, Joseph.
Ga-Jit. See General Instrument Corp.
General Instrument Corp., 225 Varick, New York, N. Y.
Herald Elec. Co., 29 East End Ave., New York, N. Y.
Hobart Bros. Co., Troy, Ohio.
Ideal. See Ankenbrandt, J. J.
Indiana Mfg. & Electric Co., Marion, Indiana.
Kietzman Electrical Mfg. Co., 234 N. Central, Gilman, Ill.
Leich Electric Co., Genoa, Ill.
Lundin Electric Machine Co., 10 Thacher, Boston, Mass.
Mallory Electric Co., Factories Bldg., Toledo, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., Rochester, N. Y.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Paneltest. See Allen Elec. & Equip. Co.
Portometer. See Allen Elec. & Equip. Co.
Portostat. See Allen Elec. & Equip. Co.
Presto. See Metal Specialties Mfg. Co.
Reliable Parts Mfg. Co., Wellington, Ohio.
Rex Batrystat. See Bartlett Products Co.
Scout. See Leich Electric Company.
Serwell Sales Corp., 1749 N. Winchester Ave., Chicago, Ill.
Test-All. See Colpin Corp.
Test-O-Meter. See Weidenhoff, Joseph.
Test-Rite. See Colpin Corp.
Victory. See Weidenhoff, Joseph.
Weidenhoff, Joseph, 4352 W. Roosevelt Rd., Chicago, Ill.

TESTING LABORATORIES

Baker & Co., Inc., 54 Austin, Newark, N. J.
Elec'l Testing Laboratories, 80th St. and East End Ave., New York, N. Y.
National Elec'l Inst. Co., 162 Sidney, Cambridge, Mass.
New York Testing Laboratories, 80 Washington, New York.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
THERMO JUNCTIONS. See Instruments, Laboratory Standard.

THERMOSTATIC METAL

Baker & Co., Inc., 54 Austin, Newark, N. J.
Chace Valve Co., W. M., 1600 Beard Ave., Detroit, Mich.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I.
General Plate Co., Attleboro, Mass.
Improved Seamless Wire Co., 775 Eddy, Providence, R. I.
Interstate Products Corp., 29 Commercial, Newark, N. J.
Venbur. See Coffin Mfg. Co., B. F.
Wilco. See H. A. Wilson Co.
Wilson Co., H. A., Newark, N. J.

THERMOSTATS

American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Appliance Co., Jackson, Mich.
Bak-Rite. See Electric Appliance Mfg. Co.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.
Burke Controller Co., 360 Lexington Ave., New York, N. Y.
Cobb Elec. Appliance Co., 100 Massachusetts Ave., Boston.
Cramblett Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Diamond H. See Hart Mfg. Co.
Electric Automatic Appliance Co., Denver, Colo.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Maid. See Hankscraft Co.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Fraas Thermo-Electric Co., 1206 S. Grove, Irvington, N. J.
Globe Mfg. Co., Battle Creek, Mich.
Hankscraft Co., 615 E. Washington, Madison, Wis.
Hart Mfg. Co., Hartford, Conn.
Hi-Lo. See Boston Machine Wks. Co.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Interstate Products Corp., 29 Commercial, Newark, N. J.
King. See Electric Heat Control Co.
Klixon. See Westinghouse Electric & Mfg. Co.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Moeller, A. E., 261 Sumpter, Brooklyn, N. Y.
Midget. See Coffin Mfg. Co., B. F.
National Steel Construction Co., 425 Fountenac, Seattle, Wash.
Pyratherm. See Federal Gauge Co.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Standard Thermometer Co., 65 Shirley, Boston 19, Mass.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Teeple Co., L. B., 540 E. 9th, Portland, Ore.
Thermolectric. See Bishop & Babcock Sales Co.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Visaflame. See Mercoid Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

TIGHTENERS, Commutator

Elmes Engineering Works, Chas. F., 230 N. Morgan, Chicago, Ill.
TIME SWITCHES. See Switches, Time.

TIN FOIL

Lehmaier, Schwartz & Co., 521 W. 25th, New York, N. Y.
United States Foil Co., 30th & Grand Sts., Louisville, Ky.
TINNING TANKS, WIRE. See Wire Manufacturing Machines.
TINSEL. See Wire, Insulated.

TINSEL, Cord and Thread

Belden Mfg. Co., 2310 B S. Western Ave., Chicago, Ill.
Diamond Braiding Mills, Chicago Heights, Chicago, Ill.
Frank & Co., M. J., 15 W. 39th St., New York, N. Y.
General Electric Co., Bridgeport, Conn.
Hy-Sil Mfg. Co., Revere, Mass.
Kilo Co., 2 E. 23rd, New York, N. Y.
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Montgomery Co., J. R., Windsor Locks, Conn.
Rockbestos Products Corp., Nicoll & Canner, New Haven, Ct.
Springfield Wire & Tinsel Co., Springfield, Mass.
Taft Co., R. C., 174 N. Franklin, Chicago, Ill.

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TIPS, Cord

Duro. See McEvoy, C. H.
McEvoy, C. H., 430 Broadway, Lowell, Mass.
National Acme Mfg. Co., 7500 Stanton Ave., Cleveland, O.
Norden & Co., S. 180 S. Water, Providence, R. I.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.
TOOLS, Commutator Slotting. See Slotting Machines & Tools, Commutator.

TOOLS, Coil Tamping

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.

TOOLS, Commutator Truing

Acme. See Green Equipment Corp.
Allen Elec. & Equipment Co., N. Pitcher St., Kalamazoo, Mich.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Central Mfg. Co., Fairfield, Ia.
Green Equipment Corp., Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Jordan Bros., 74 Beekman, New York, N. Y.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, Ohio.

TOOLS, Storage Battery

Battery Equipment & Supply Co., 7530 Greenwood Ave., Chicago, Ill. Burning Racks, Battery Trucks, Plate Pressers, Mallets, Lead Burners and Strainers.
Battery Parts Co., Inc., Wilkinsburg, Pa. (Leads.)
Battery Tools Co., 29 Willow, Montclair, N. J.
Besco. See Battery Equipment & Supply Co.
Bobbett Elec. Mfg. Co., 811 E. 43rd St., Chicago, Ill. (Knife Heaters.)
Canedy-Otto Mfg. Co., 1816 McGee, Chicago Heights, Ill. (Floor Vises.)
General Elec. Co., Schenectady. (Lead Burning Outfits.)
Heet-A-Knife. See Op-al Elec. & Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati. (Terminals.)
Op-al Elec. & Mfg. Co., 1057 E. 30th St., Indianapolis, Ind. (Knife Heaters.)
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa. (Pillar Post Sleeves, Tongs, Reamers, Strap Punches, Terminal Pullers, Steamers, Racks or Stands, Terminal Post Shapers, Battery Analyzer, Post Sealing Machine, Plate Burning Press, Press and Stands.)
Pyratip. See General Elec. Co.
Reliable Parts Mfg. Co., Wellington, O. (Steamer and Still, Filler, Separator Cutter, Clips, Carrier, Post Cutter, Terminal and Cell Puller.)
Thompson Mfg. Co., Meadville, Pa. (Reamers, Terminal Post Pullers, Pressing Tongs.)

TORCHES AND FURNACES

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Bernz Co., Otto, Newark, N. J.
Clayton & Lambert Mfg. Co., Detroit, Mich.
Dreadnaught. See Wall Mfg. Supply Co.
Klein & Sons, Mathias, Chicago, Ill.
McGill Mfg. Co., Valparaiso, Ind.
Staysalite. See Klein & Sons, Mathias.
TORPEDO Cord. See Twine.
TORSION BALANCES. See Instruments, Laboratory Standard

TRANSFORMERS

Radio. See Radio Circuit Components.
Gas Tube Sign. See Transformers, Oil Burner.
Oil Burner Ignition. See Transformers, Low & Intermediate Voltage.

TRANSFORMERS, Low and Intermediate Voltage

For Oil Burners, Gas Tube Signs, and other special purposes.
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American Transformer Co., Newark, N. J.
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Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
General Electric Co. (Merchandise Dept.), Bridgeport, Conn.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
K-W Ignition Corp., 2811 Chester Ave., Cleveland, Ohio.
Manhattan Elect. Supply Co., 510 Sixth Ave., New York.
Sergel Electric Co., 89 W. Water, Milwaukee, Wis.
Standard Transformer Co., Warren, O.
Thordarson Elec. Mfg. Co., Huron & Kingsbury Sts., Chicago, Ill.
Uptigraff Mfg. Co., R. E., First National Bank Bldg., Pittsburgh, Pa.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Webster Electric Co., Racine, Wis.
TRANSMISSION DRIVES. See Chain, Transmission.

TRANSMITTERS, Power

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Segur. See Electric Service Supplies Co.
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TRUCKS, Armature. See Lifts, Armature.

TRUCKS, Factory Steel

Angle Steel Stool Co., Plainwell, Mich.
TRUING Devices, Commutator. See Tools, Commutator.
TUBE (Tubes) (Tubing) Adapters. See Radio Receiver Parts
Aluminum. See Aluminum.
Brass. See Tubing, Brass.
Condenser. See Tubing, Brass and Copper.
Copper. See Tubing, Brass.
Cutters. See Stocks, Dies, etc.
Fibre. See Fibre.
Fibre Candle. See Candles.
Mica. See Mica.
Paper. See Tubes, Paper.
Platinum. See Platinum.

Pyrometer. See Cores, Resistance.
Refractory. See Cores, Resistance.
Radio. See Radio Vacuum Tubes.
Varnished Fabric. See Tubing, Varnished Fabric.

TUBES, Paper; Cores; Sleeves, Bushings

Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Climax Tube Co., Mystic, Conn.
Klimaxcore. See Climax Tube Co.
McLausland, J. E., 86 Valley, Providence, R. I.
Pairpoint Corp., New Bedford, Mass.
Paper Tube Co., 1718 N. Damen Ave., Chicago, Ill.
Reliable Elec. Co., 3145 Carroll Ave., Chicago, Ill.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.
Stone Paper Tube Co., 38 O. N. E., Washington, D. C.
Textile Tube Co., Fall River, Mass. (Paper Sleeves.)

TUBING, Brass and Copper

American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Baltimore Tube Co., 1301 Wicomico, Baltimore, Md.
Bridgeport Brass Co., Bridgeport, Conn.
Bull Dog. See National Elec. Products Corp.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., T. K., 54 Lafayette, New York.
Cook, Dunbar Smith Co., 85 Sprague, Providence, R. I.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
French Mfg. Co., 128 Robbins, Waterbury, Conn.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, 5851 Jefferson Ave., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
National Copper & Smelting Co., 1395 Coltman Rd., Cleveland, O.
National Elec. Products Corp., Pittsburgh, Pa.
Nelleum. See Mueller Brass Co.
Roberts Tube Works, 2500 Military Ave., Detroit, Mich.
Rome Brass & Copper Co., Rome, N. Y.
Rome Hollow Wire & Tube Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.
Rome Turney Radiator Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa.
Summertill Tubing Co., Bridgeport, Pa.
Torrington Mfg. Co., Torrington, Conn.
United Wire & Supply Co., 1497 Elmwood Ave., Providence.
Wells Co., A. H., Watertown Ave., Waterbury, Conn.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

TUBING, Flexible Metallic

(Flexible Tubing.)
Almond Mfg. Co., T. B., Ashburnham, Mass.
American Metal Hose Co., Waterbury, Conn.
American Metal Moulding Co., 146 Colt St., Irvington, N. J.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.
Auto-Brassflex. See National Metal Elec. Products Corp.
Auto-Steelflex. See National Metal Elec. Products Corp.
Breeze Corp., Inc., 24 S. 6th, Newark, N. J.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
National Elec. Products Corp., 1110 Fulton Bldg., Pittsburgh, Pa.
Riflex. See United Metal Hose Co.
Sleeper & Hartley, Inc., Worcester, Mass.
Time-O-Stat Controls Co., Elkhart, Ind.
Titeflex Metal Hose Co., Newark, N. J.
Triangle Conduit Co., Dry Harbor Rd. and Cooper Ave., Brooklyn, N. Y.
United Metal Hose Co., 724 Garrison Ave., New York, N. Y.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York.

TUBING, Rubber

Rubber Tubing for Insulating Wire in Instruments and Telegraph Signal Lines.
Canfield Rubber Co., 702 Railroad Ave., Bridgeport, Conn.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Faultless Rubber Co., Ashland, O.
Forest City Rubber Co., 1276 Ontario, Cleveland, O.
Goodrich Rubber Co., B. F., Akron, O.
Rubber-Vac. See Eisler Electric Corp.
Tyler Rubber Co., Andover, Mass.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.

TUBING, Varnished Fabric

Insulating Tubing—Spaghetti.
Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Bentley-Harris Mfg. Co., Conshohocken, Pa.
Brand & Co., William, 288 Fourth Ave., New York, N. Y.
Empire. See Mica Insulator Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insulated Duct & Cable Co., Stokes, Trenton, N. J.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky. (Insulated Waxed Cotton.)
Turbo. See Brand & Co.
Varflex Corp., Rome, N. Y.
TURNED-UP BOXES AND CABINETS. See Cabinets, Sheet Steel.
TURNING TOOLS, COMMUTATOR. See Tools, Commutator Truing.

TWINE, Armature Winding; Torpedo Cord

Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Winne & Son, Frank W., 42 N. Front, Philadelphia, Pa.
UNDERCUTTERS, Mica. See Slotting Machines & Tools, Commutator.
UNITS, Refrigerator Condenser. See Condenser Units, Refrigerator.

UNITS, Rods and Grids, Resistance

Acme Elec. Heating Co., Dept. R, 1217 Washington, Boston.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa.
Bradleyunit. See Allen Bradley Co.
Buffalo Products Co., Broome & Lafayette Sts., New York.
Burger, J. P., 1813 Columbus Rd., Cleveland, O.
Calrod. See Edison Elec. Appliance Co.
Chromalox. See Edwin L. Wiegand Co.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Crown Coloring & Chemical Co., 33 W. 17th, New York.
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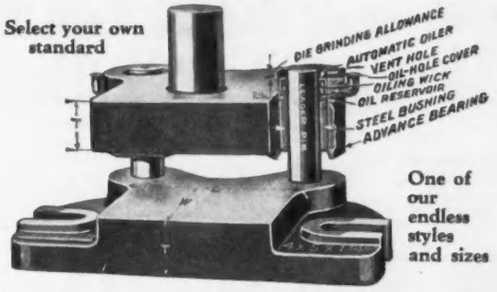

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Edgerest. See Industrial Controller Div.
Edgewound. See Monitor Controller Co.
Edison Electric Appliance Co., 5618 W. Taylor, Chicago, Ill.
Elec. Controller & Mfg. Co., 2700 E. 79th, Cleveland, O
Electro Thermal-Unit Co., 44 N. Fourth, Philadelphia, Pa
Elemite. See Louthan Mfg. Co.
Erie Resistor Corp., 644 W. Twelfth, Erie, Pa.
Fits-All. See Eagle Elec. Mfg. Co.
Fitz-All. See Rodale Mfg. Co.
Fitz-Rite. See Rodale Mfg. Co.
Fix-All. See Witlow Elec. Mfg. Co.
F & M. See Hiram Marks Elec. Co.
General Electric Co., Schenectady, N. Y.
Globar Corp., Niagara Falls, N. Y.
Glo-Well. See Eagle Elec. Mfg. Co.
Gold Seal Elect. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hance-Parker Mfg. Co., 397 West Main, Meriden, Conn.
Hankscraft Co., 615 E. Washington, Madison, Wis. (Oven Heater Unit.)
Hardwick, Hindle, Inc., 122 Greenwich, New York, N. Y.
Hexwound. See Monitor Controller Co.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Industrial Heater Co., 300 Canal, New York, N. Y.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa (Radio Resistance.)
Krischer's Mfg. Co., 255 Calyer, Brooklyn.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J.
Louthan Mfg. Co., East Liverpool, O.
Marks, Elec. Co., Hiram, 204 Woodward Ave., Detroit, Mich
Monitor Edgewound. See Clark Controller Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Nelco. See Nelson Electric Co.
Nelson Electric Co., Plant City, Fla.
Northern Electric Co., 2833 N. Western Ave., Chicago, Ill
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Poloron Elec. Mfg. Co., 20 Bond, New York, N. Y.
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Pyrox. See Westinghouse Elec. & Mfg. Co.
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Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Smoothwound. See Monitor Controller Co.
Snoco. See Snow & Co.
Snow & Co., E. W., Rochester, N. Y.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa
Super. See Northern Elec. Co.
United Metal Art Mfg. Co., 293 Wyckoff Ave., Brooklyn, N. Y
Vitrohm. See Ward Leonard Elec. Co.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago
Ward Leonard Elec. Co., 31 South, Mt. Vernen, N. Y
Warren Elec. Appliance Co., Warren, Pa.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo
Westinghouse Elec. & Mfg. Co., Mansfield, O
Wiegand Co., Edwin L., 7516 Thomas Blvd., Pittsburgh, Pa.
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VACUUM DRYING & IMPREGNATING OVENS. See Ovens, Industrial.
VACUUM PUMPS. See Pumps, Vacuum.

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asco. See Automatic Switch Co.
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Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 Michigan Ave., S., Chicago, Ill.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee
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Electric-Valve Mfg. Co., 68 Murray, New York, N. Y.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gas-Gard Co., 375 Main St., E., Rochester, N. Y. (Gas.)
General Electric Co., Schenectady, N. Y.
Golden-Anderson Valve Specialty Co., 1385 Fulton Bldg., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Minneapolis-Honeywell Regulator Co., Fourth Ave. & 28th Minneapolis, Minn.
Nacco Mfg. Co., 1483 Clara Ave., St. Louis, Mo.
Northside Elec. Co., 4227 Spring Grove Ave., Cincinnati, O
Reading Steel Casting Co., Bridgeport, Conn.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
St. Louis Motor Valve Co., St. Louis, Mo.
Sentinel. See Electric Steam Radiator Co.
Tagliabue Mfg. Co., C. J., 18-83rd St., Brooklyn, N. Y
Teeple Co., L. R., 540 E. Ninth, Portland, Ore. (Gas.)
Time-O-Stat Controls Co., Elkhart, Ind.
Victor. See Lunkenheimer Co.
Zeco. See Zisch Engineering Corp.
Zisch Engineering Corp., 39 Avenue L, Newark, N. J. (Gas.)
VARNISH. See Paint, Varnish, Lacquer.
VARNISHED TAPE. See Tape, Varnished Fabric.
VARNISHED TUBING. See Tubing, Varnished Fabric.
VOLT BOXES. See Instruments, Laboratory Standard.
VOLTMETERS. See Instruments.
VULCANITE. See Rubber, Hard.

VULCANIZERS, WIRE INSULATION

American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
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WASHERS, FIBRE. See Fibre.

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WASHERS, Lock

Hobbs Mfg. Co., Worcester, Mass.
Keystone. See Positive Lock Washer Co.
National Lock Washer Co., Newark, N. J.
Positive Lock Washer Co., Ave. A & Miller, Newark, N. J
Shakeproof Lockwasher Co., 2513 N. Keeler Ave., Chicago
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Chase Brass & Copper Co., Waterbury, Conn.
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New England Screw Co., Dept. A., 44 Farnsworth, Boston.
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Wrought Washer Mfg. Co., 46 S. Bay, Milwaukee, Wis.
WATTMETERS. See Instruments.

WAX AND COMPOUNDS

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Junction Box, Potheads, Battery Tops, Bolt Head Holes.
Wax and Compound.....See S
Saturating and Finishing, Braided Wire, Impregnating Fabric and Paper.
Chatterton's Compound.....See C
Ackurate Rubber Co., 25 Beaver, New York, N. Y. W . . .
Ajax. See Sherwin-Williams Co.
Asphalt Products Co., 6531 S. State, Chicago.. . . S . .
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. C
Biwax Corp., 208 S. La Salle, Chicago, Ill.... W S . .
Black Nego. See Williams Co., F. M.
Bulls-Eye. See Zinsser & Co.
Cablelene. See Vacuum Oil Co.
Candy & Co., 35th and Maplewood Ave., Chicago W S . .
Cerowax. See Vacuum Oil Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston... . . . C
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J. W S . .
Dolph Co., John C., 168 Emmet, Newark, N. J. W . . .
Dl Electric Puttie. See Ackurate Rubber Co.
Ever-Protect. See National Cable Compound Co.
Flake White. See Williams Co., F. M.
General Electric Co., Bridgeport, Conn..... W . . .
Geoge Co., P. A., 4153 Bingham Ave., St. Louis. W . . .
Globe Chemical Co., Murray Road & Big 4 R. R. St Bernard, Cincinnati, O..... W S . .
Goldo Brown. See Williams Co., F. M.
Great Lakes Thread & Yarn Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit... W . . .
Hercules Powder Co., 975 Market, Wilmington, Del. (Wood Rosin) . . . . . S . .
Hexsulate See Tar Products Corp.
Imco. See Great Lakes Thread & Yarn Co.
India Red Seal. See Williams Co., F. M.
Insulatine Co., 1 Broadway, New York..... W . . .
Insulation. See Vacuum Oil Co.
Knox & Morse Co., 80 Freeport, Boston, Mass..... W S . .
Leverite. See Mitchell-Rand Mfg. Co.
Lime Seal. See Mitchell-Rand Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind..... . . C
Mineralac Elec. Co., 1045 Washington Blvd., Chicago, Ill. . . . . W . . .
Mitchell-Rand Mfg. Co., 19 Vesey, New York.... W S C
Mule-Hide. See Lehon Co.
National Cable Compound Co., Mitchell, Ind.... W . . .
National Wax Co., 189 W. Madison, Chicago, Ill. . . S . .
Nu-Blac. See Star Porcelain Co.
Par Flexo. See Williams Co., F. M.
Rubberseal. See Mitchell-Rand Mfg. Co.
Rub-Flexo. See Williams Co., F. M.
Seidner & Enequist, Inc., 86 Hausman, Brooklyn, N. Y. . . . . W . . .
Sherwin-Williams Co., Cleveland, O..... W . . C
Standard Varnish Wks., 433 4th Av., New York.. W . . .
Standard Wax & Import Co., 110 E. 42nd, New York, N. Y. . . . . W S . .
Star Porcelain Co., Trenton, N. J..... W . . C
Taerite. See Seidner & Enequist, Inc
Tar Products Corp., Indiana Trust Bldg., Providence, R. I.
Trotter & Co., E. T., 576 Johnson Ave., Brooklyn, N. Y. . . . . W S . .
Vacuum Oil Co., 61 Broadway, New York, N. Y. W . . .
Warner-Quinlan Co., 2 Park Ave., New York, N. Y. . . . C
Waverly Oil Wks., 54th and A. V. R. R., Pittsburgh, Pa. . . . . S
Williams Co., F. M., 1288 Prospect Ave., Brooklyn, N. Y
Zinsser & Co., 48 Vesey, New York, N. Y..... W . . .
WEDGE DRIVERS. See Tools, Commutator.
WELDS, Lamp Lead-in. See Filaments, Incandescent

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Almanc. See Allan Mfg. & Welding Co., Inc.
Alternare. See Electric Arc Cutting & Welding Co.
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Ames Co., 115 Ninth, Brooklyn, N. Y.
Burke Electric Co., Erie, Pa.
Cushing Mfg. Co., 5617 Pacific Blvd., Los Angeles, Cal.
Dwyer Machine Co., Lynn, Mass.
Economy Electric Products Co., 2400 Woodland Ave., Cleveland, O.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Electric Arc Cutting & Welding Co., 156 Jelliff Ave., Newark, N. J.
Electric Welding Co. of America, 744 Court, Brooklyn, N. Y.
Electric Welding Machine Co., 1539 Larned, E., Detroit.
Farwest Electric Welder Co., 1107 Northlake Ave., Seattle
Federal Machine & Welder Co., Dana Ave., Warren, O.
Fleet-Weld. See Lincoln Elec. Co.
Fusion Welding Corp., 10257 Torrence Ave., Chicago.

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General Electric Co., Schenectady, N. Y.
General Engrg. & Supply Co., 160 5th Ave., New York, N. Y.
Gibb Welding Machines Co., Bay City, Mich.
Hansen. See Northwestern Mfg. Co.
Hollup Corp., C. H., 3333 W. 48th Place, Chicago, Ill.
Lincoln Electric Co., Coit Rd. and Kirby Ave. Cleveland.
Lundy Co., E. A., Fulton Bldg., Pittsburgh, Pa.
McAdams Co., J. C., New Britain, Conn.
Nigg Engineering Corp., Second St. & Covina Blvd., Covina, Cal.
Northwestern Mfg. Co., 480 Clinton, Milwaukee, Wis.
Owen Elec. Mfg. Co., Fayetteville, N. C.
Plastic Arc. See Wilson Welder & Metal Co.
Pyrotip. See General Elec. Co.
Quasi-Arc, Inc., 11 W. 42nd St., New York, N. Y.
Rhason Mfg. Co., 217 45th, Union City, N. J.
Ryerson & son, Jos. T., 2558 W. 16th, Chicago, Ill.
Sellars Arc Welder Co., 1200 Fourth Ave., Seattle, Wash.
Seneca Electric Welder Corp., 5057 Woodward, Detroit, Mich.
Siemund Wenzel Electric Welding Co., 79 Hancock, Long Island City, N. Y.
Swift Elec. Welder Co., 2567 W. Grand Blvd., Detroit,
Taylor-Winfield Corp., Mahoning Ave., Warren, O.
Thompson Electric Welding Co., Lynn, Mass.
Una Welding & Bonding Co., 1615 Collamer Ave., Cleveland, O.
U. S. L. Battery Corp., Niagara Falls, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metal Co., Hoboken factory, Terminal Bldg., Hoboken, N. J.
Zeus. See Gibb Welding Machine Co.
WHEATSTONE BRIDGES. See Instruments, Laboratory Standard.

WICKS, Lubricating

Brawley, T. R., 279 20th, Brooklyn, N. Y.

WINDERS

Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Coil. See Winding Machines, Armature & Field Coil.
Electromagnet. See Winding Machines, Induction Coil.
Filament. See Machines, Lamp Making.
Induction Coil. See Winding Machines, Induction Coil.
Loop. See Winding Machines, Armature & Field Coil.

WINDING MACHINES, Armature and Field Coil

Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning. See Mutual Foundry & Machine Co.
Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Conran, Frederick M., 107 Colden, Newark, N. J.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Handy. See Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Herald Electric Co., 29 East End Ave., New York, N. Y.
Hunsdorf, Wm., 2056 E. Fourth, Cleveland, O.
Liberty Starter Co., 271 Vinewood Ave., Detroit, Mich.
Lipe, W. C., 208 S. Geddes, Syracuse, N. Y.
Mutual Foundry & Machine Co., Atlanta, Ga.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Co., Frank, 253 A St., Boston, Mass.
Segur. See Electric Service Supplies Co.
Superior. See Armature Coil Equipment Co.

WINDING MACHINES, Induction Coil

Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Conran, Frederick M., 107 Colden, Newark, N. J.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J
Leesona. See Universal Winding Co.
Lipe, W. C., 208 S. Geddes, Syracuse, N. Y.
Morris Register Co., 29th & Broadway, Council Bluffs, Iowa.
Radio Production Machinery Co., 312 Centre, New York.
Universal Winding Co., Boston, Mass.
Viking Tool & Machine Co., 747 65th, Brooklyn, N. Y.
Weehawken Engineering Co., 543 Gregory Ave., Weehawken, N. J.
WINDINGS. See Coils, Finished.

WINDOW SHADES, Factory

Athey Co., 6142 West 65th St., Chicago, Ill.

WIRE (Cable) (Cord), Aluminum. See Aluminum.

Copper Clad. See Wire, Copper Clad.
Forms. See Forms, Wire.
Frames. See Forms, Wire.
Fuse. See Fuses and Fuse Wire.
Lamp & Tube Filament. See Filaments, Incandescent Lamp.
Magnet. See Wire, Insulated.
Molybdenum. See Molybdenum.
Phosphor Bronze. See Phosphor Bronze.
Platinum. See Platinum.
Radio Bus. See Wire, Bare.
Scrapers. See Strippers.
Strippers. See Strippers.
Tungsten. See Filament, Incandescent Lamp.

WIRE, Bare

Armature Banding .....See S
Copper Wire .....See C
Iron Wire .....See S
Phosphor Bronze .....See B
Radio Bus Wire .....See C
Resistance Wire .....See E
Steel Wire .....See S

Acme. See Alloy Metal Wire Co.
Alpha Wire Corp., 520 Broadway, New York.. C B . .
Advance. See Driver Harris Wire Co.
Alloy Metal Wire Co., Moore, Pa..... C B . .
American Copper Products Corp., 253 Broadway, New York, N. Y. . . . . C B . .
American Electrical Works (Phillipsdale), Providence, R. I. . . . . C . . .

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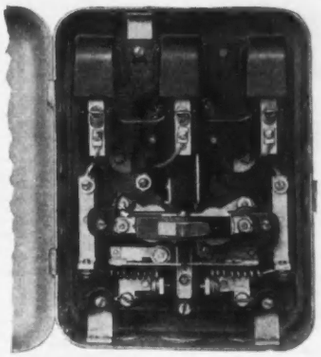

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WIRE, Bare—Continued

American Insulated Wire & Cable Co., Div. of General Cable Corp., 954 W. 21st, Chicago.... C .. S
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. .. R F H A T M
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. .. C ...
Anglite Elec. Co., Fort Wayne, Ind. .. C ...
Ballast. See Gilby Wire Co.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md. .. C ...
Bassett Metal Goods Co., Derby, Conn. (General Sales Agent, Hatheway & Co., 16 Hudson, New York, N. Y. .. C ...
Belden Mfg. Co., 2310B S. Western Ave., Chicago C .. S
Beldenite. See Belden Mfg. Co.
Bradford, Kyle & Co., Plymouth, Mass. .. B ..
Braidite. See Cornish Wire Co.
Bronvar. See American Insulated Wire & Cable Co.
Bridgeport Brass Co., Bridgeport, Conn. .. C ...
Calido. See Driver Harris Wire Co.
Chromel. See Hoskins Mfg. Co.
Chromic. See Murray-Harris Wire Co.
Climax. See Driver Harris Wire Co.
Comet. See Driver Harris Wire Co.
Comin. See Gilby Wire Co.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I. C ...
Copel. See Hoskins Mfg. Co.
Copperweld Steel Co., Glassport, Pa. .. C .. S
Cornish Wire Co., 30 Church, New York, N. Y.. C ...
Corwico. See Cornish Wire Co.
Crape. See Indiana Steel & Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.. C ...
Cupren. See Gilby Wire Co.
Darow Mfg. Co., 36 E. 20th, New York, N. Y... C ...
Detroit Insulated Wire Co., Detroit, Mich. .. C ...
1885. See Chicago Insulated Wire & Mfg. Co.
Driver Harris Wire Co., Harrison, N. J. .. R ..
Electron. See Bassett Metal Goods Co.
Excelicier. See Branford Elec. Co.
Fullman Mfg. Co., 1209 Jefferson, Latrobe, Pa. ...
Gilby Wire Co., Riverside Ave., Newark, N. J. .. R
Goldmark Co., James, 83 Warren, New York.. C ...
Hope Webbing Co., 1005 Main, Pawtucket, R. I. (Braided Wire Tape) .. C ...
Hoskins Mfg. Co., 4415 Lawton Ave., Detroit, Mich. .. R ..
Hudson Wire Co., Ossining, N. Y. .. C R ..
Ideal. See Driver Harris Wire Co.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. .. C .. S
Indiana Steel & Wire Co., Muncie, Ind. .. S
Karma. See Driver Harris Wire Co.
Keystone. See Fullman Mfg. Co.
Lucero. See Driver Harris Wire Co.
Marion Insulated Wire & Rubber Co., Marion, Ind. C ...
Monex. See Standard Alloy Wire Co.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J. .. R ..
Nehring Electrical Works, De Kalb, Ill. .. C ...
Nichrome. See Driver Harris Wire Co.
Novar. See Standard Alloy Wire Co.
Page Steel & Wire Co., Bridgeport, Conn. .. S
Paranite. See Indiana Rubber & Insulated Wire Co.
Peerless. See Alloy Metal Wire Co.
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. .. C ...
Pheno-Electric. See Bridgeport Brass Co.
Premier. See Alloy Metal Wire Co.
Providence Insulated Wire Co., Providence, R. I.. C ...
Race. See Roe Wire Co.
Revolute Wire Co., Hastings-on-Hudson, N. Y.... C ...
Rice Co., A. H., Pittsfield, Mass. .. C ...
Roebling's Sons Co., John A., Trenton, N. J. .. C .. S
Rome Wire Co., Div. of General Cable Co., Rome, N. Y. .. C ...
Ross Wire Co., 69 Bath, Providence, R. I. .. C ...
Semens Wire & Mfg. Co., Fostoria, O. .. S
Silcrimp. See Valley Narrow Fabric Co.
Silectron. See Standard Alloy Wire Co.
Solar. See Gilby Wire Co.
Sparg Wire Co., V. A., Rome, N. Y. .. C ...
Standard Alloy Wire Co., Elizabeth, N. J. .. R S
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa. .. C ...
Super-Insulated Wire Co., Plymouth, Mass. .. C ...
Superior. See Alloy Metal Wire Co.
Talking Tape. See Hope Webbing Co.
Therlo. See Driver Harris Wire Co.
Tophet. See Gilby Wire Co.
Tru-Lay. See Page Steel & Wire Co.
Valley Narrow Fabric Co., Falls, R. I.
Wheeler Insulated Wire Co., Bridgeport, Conn.. C ...

WIRE, Copper Clad

Copperweld Steel Co., Glassport, Pa.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.

WIRE SOLDER. See Solder, Bar and Wire.

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Sleeper-Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., 70 Franklin, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio.
Wire Machinery Corp. of Am., New Haven, Conn.

WIRE, Insulated

KEY

Annunciator, Office, Bell Wire....See A
Asbestos Covered Heater Cord.....See H
Asbestos Covered Magnet Wire....See M
Enameled Magnet Wire .....See M
Fixture Wire .....See R
Flexible Reinforced Heavy Duty Cord .....See F
Heater Cord .....See H
Ignition Cable .....See R
Lamp Cord .....See R
Magnet Wire .....See M
Rubber Covered Wire & Cable..See R
Stove Wire .....See H
Telephone Cord .....See T

A-A Wire Co. (Div. of General Cable Corp), 420 Lexington Ave., N. Y. C.. R .. ..
A-1 Brand. See American Insulated.
Acme Wire Co., New Haven, Conn. Enamaled Silk, Cotton .... M
Amelectric. See American Elec.
American Braiding Co., Holyoke, Mass. R .. ..
American Brand. See American Insulated Wire & Cable Co.
American Copper Products Corp., 233 Broadway, New York, N. Y. .. ..
American Electrical Works (Philipsdale), Providence, R. I. .. .. M
American Enameled Magnet Wire Co., Muskegon, Mich. .. .. M
American Insulated Wire & Cable Co. Div. of General Cable Co., 954 W. 21st, Chicago, Ill. .. .. M
American Insulated Wire Corp., Div. of General Cable Co., 45 Baker, Providence, R. I. .. .. R F .. A T ..
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. .. .. R F H A T M
Americore. See American Steel.
Amerite. See American Steel.
Amerixe. See American Steel.
Amparak. See American Steel.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. .. .. R W .. A .. M
Anaconda Wire & Cable Co., Pawtucket, R. I. .. .. R F .. ..
Anaconda Wire & Cable Co., Maring Wire Branch, Muskegon, Mich. (Silk, Enamel) .. .. M
Ansonia Electrical Co., Ansonia, Conn. Silk, Cotton, Enameled .. .. A .. M
Armoriokt. See American Steel.
Bay State Insulated Wire & Cable Co., Paydras (Mattapan), 26, Boston..... R .. ..
Chicago, Ill. .. .. R F H A T M
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Beldenamel. See Belden Mfg. Co.
Beldenite. See Belden Mfg. Co.
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. .. .. R F .. ..
Boston Insulated Wire & Cable Co., 65 Bay, Boston, Mass. .. .. R F H .. .. ..
Bradford, Kyle & Co., Plymouth, Mass. .. .. M
Cablex. See Collyer Insulated Wire Co.
Celatsite. See Acme Wire Co.
Collyer Insulated Wire Co., Pawtucket, R. I. .. .. R F H .. ..
Colorbeston. See General Elec. Co.
Condex. See Simplex Wire Co.
Colorubber. See Belden Mfg. Co.
Copperweld Steel Co., Rankin, Pa..... R .. .. T ..
Colenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J. .. .. R F H A T M
Darow Mfg. Co., 36 E. 20th, New York. R .. ..
Davis-Jones Insulated Wire Co., Pawtucket, R. I. .. .. R F H A T ..
Deltabeston. See York Insulated.
Detroit Insulated Wire Co., Detroit, Mich. R .. .. T ..
Diamond Braiding Mills, Chicago Heights R F H .. .. M
Di-Noburn. See Diamond Braiding Mill.
Dreadnaught. See Indiana Rubber Co.
Driver-Harris Co., Harrison, N. J..... R .. H .. ..
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne, Ind.. .. .. M
Ducatto. See Dudlo Mfg. Co.
Durabilt. See Anaconda Wire & Cable Co.
Duracord. See Anaconda Wire & Cable Co.
Durawire. See Anaconda Wire & Cable Co.
Duro. See McEvoy, C. H.
Eagle. See Goldmark Co., James.
Eastern Insulated Wire Co., Tilton, N. H. R .. ..
1885. See Chicago Insulated Wire.
Enamelite. See Acme Wire Co.
Enterite. See Rome Wire Co.
Fibrex. See Simplex Wire Co.
Flexible Woven Cable Co., 755 Boylston, Boston, Mass. .. .. F .. ..
Flex-O-Cord. See Packard Elec. Co.
Garco. See General Asbestos Co.
Gavitt Mfg. Co., West Brookfield, Mass. .. .. T ..
GE-Flex. See General Elec. Co.
General Asbestos & Rubber Co., Charleston, S. C. .. .. H .. ..
General Elec. Co., Merchandise Dept., W2311, Bridgeport, Conn .. .. R F H .. .. M
Giant. See Collyer Insulated Wire.
Goldmark Co., James, 83 Warren, New York, Annunciator and Asbestos, Cotton, Silk and Enameled Magnet .. .. A .. M
Goodyear Rubber Insulating. See Graybar Electric Co.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y. R .. .. .. T ..
Grimshaw. See New York Ins.
Hatex. See Hatfield Rubber Wks.
Hatfield Rubber Wks., Inc., Hillside, N. J. .. .. R F H .. T ..
Hazacord. See Hazard Insulated Wire Works.
Hazard Insulated Wire Works, Div. of Okonite Co., Wilkes-Barre, Pa.... R F .. A .. ..
Holyoke Co., 621 Broadway, New York.. R .. .. A .. ..
Inca Mfg. Co., Fort Wayne, Ind. .. .. M
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. .. .. R F H .. .. ..
I. X. L. See Collyer Insulated.
Kable. See Safety Cable Co.
Kenrite. See American Insulated.
Kerite Ins. Wire Cable Co., 30 Church, New York, N. Y. .. .. R .. ..
Kilo. Co., 2 E. 23d, New York.. .. .. T M
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia, Pa. .. .. T ..
Lowell Insulated Wire Co., Lowell, Mass. R F H .. .. ..
Liberty. See Nat. Metal Molding.
Loxsteel. See Hazard Insulated Wire Works.
McEvoy, C. H., Lowell, Mass. .. .. R .. .. .. T ..
Marion Insulated Wire & Rubber Co., Marion, Ind. .. .. R F H A T ..
Massachusetts Elec. Mfg. Co., West Lynn, Mass. .. .. M
Montgomery Co., J. R., Windsor Locks, Conn. .. .. T ..
National Elec. Products Corp., Pittsburgh. R F H A T M
N. E. See Goldmark Co., James.
New York Insulated Wire Co., 114 Liberty, New York, N. Y. .. .. R .. ..
Nitro. See Belden Mfg. Co.
O. K. See Phillips Wire Co. Also
Okocord. See Okonite Co.
Okonite Co., Passaic, N. J. .. .. R .. ..
Ozex. See Simplex Insulated Wire
Packard Electric Co., Warren, O. .. .. R F .. ..
Parac. See Phillips Wire Co.
Paracore. See U. S. Rubber Co.
Paraflex. See Bishop Wire & Cable.
Paranite. See Indiana Rubber.
Parkerite. See Seward Wire Co.
Peco. See Packard Elec. Co.
Philadelphia Insulated Wire Co., 200 N. Third, Philadelphia, Pa. .. .. H A T ..
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. .. .. R .. ..
Providence Insulated Wire Co., Providence R F H A .. ..
Raven Core. See New York.
Reliance. See American Steel.
Rockbestos Products Corp., Nicoll & Conner Sts., New Haven, Conn. .. .. R .. H .. T M
Roebling's Sons Co., John A., Trenton, N. J. .. .. R F H A T M
Rome Electrical Co., Inc., Div. of General Cable Corp., Rome, N. Y. .. .. M
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y. .. .. R F H .. T M
Ross Wire Co., 69 Bath, Providence, R. I.. R .. ..
Romoxide. See Rome Wire Co.
Ruffcoat. See Rome Wire Co.
Runzel-Lenz Elec. Mfg. Co., 1751 N. Western Ave., Chicago, Ill. .. .. T ..
Safety Cable Co. (Div. of General Cable Corp.), New York .. .. R F H .. .. ..
Salamander. See York Insulated.
Seward Wire Co., Parkersburg, W. Va. R .. ..
Silkenamel. See Belden Mfg. Co.
Silkenite. See Acme Wire Co.
Simcore. See Simplex Wire.
Simplex Wire & Cable Co., 63 Sydney, Cambridge, Mass. .. .. R F .. ..
Shield. See Ansonia Elec'l Co.
Southern States Cable Co., Div. of General Cable Corp., Mobile, Ala. .. .. M
Spiralweave. See Hazard Ins. Wire
Standard Alloy Wire Co., Elizabeth, N. J. .. .. H .. ..
Standard Underground Cable Co., Pittsburgh, Pa. (Div. of General Cable.) R F H A T ..
Sterling. See Standard Underground.
Sterling Insulated Wire Co., Fall River, Mass. .. .. R .. ..
Strand & Sweet Mfg. Co., Winsted, Conn. .. .. M
Super-Service. See Rome Wire Co.

WIRE, Insulated—Continued

Sweetstrand. See Strand & Sweet.
Tip-Top. See Standard Underground.
Tirex. See Simplex Wire & Cable.
Trenchlay. See Rome Wire Co.
Triangle Conduit Co., Dry Harbor Rd. & Cooper Ave., Brooklyn..... R .. ..
Tubulo Woven Fabric Co., Pawtucket, R. I. .. .. R F .. ..
United States Rubber Co., 1790 Broadway, New York, N. Y. .. .. R .. H A T ..
U. S. Royal. See United States.
Varflex Corp., Rome, N. Y. .. .. M
Warrior. See American Copper.
Wheeler Insulated Wire Co., Bridgeport, Conn. .. .. R F H A T M
White, J. M., 1128 Oliver, Philadelphia, Pa. .. .. R F H .. T ..
Whitney Blake Co. See Graybar Electric Co.
Wovenite. See Flexible Woven.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y. .. .. R .. H .. .. M

WIRE MANUFACTURING MACHINES

(See Also Wire Drawing Machines; Insulation Mixers; Taping Machines, Wire; Wire Polishing Machines; Enameling Machines for Magnet Wire; Wire Wrapping Machines; Vulcanizers, Wire Insulation.)

Armoring Machines .....See A
Braiding Machines .....See B
Bunching Machines .....See S
Covering Machines .....See I
Insulating Machines .....See I
Insulation Straining Machines..See I
Measuring Machines .....See M
Park Cabling Machines.....See A
Saturating Tanks .....See F
Spooling Machines .....See U
Stranding Machines .....See S
Tinning Tanks .....See F
Winding Reels .....See U

Adamson Machine Co., Akron, Ohio.. I A .. ..
Aimco-Seward. See American Insulating Machinery Co.
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa. I A .. .. S U F
Breguet. See American Insulating
Crescent. See Royle & Sons, John.
Durant Mfg. Co., 662 Buffum, Milwaukee, Wis. .. .. M .. U ..
Housatonic Machine & Tool Co., Bridgeport, Conn. .. .. I .. .. U ..
Minneapolis Elec. & Construction Co., 80 S. 12th St., Minneapolis, Minn. .. .. .. M .. U ..
Nebuttco. See New England Butt Co.
New England Butt Co., 324 Pearl, Providence, R. I. .. .. I A B M S U ..
Peerless. See Royle & Sons, John.
Royle & Sons, John, Paterson, N. J. I .. ..

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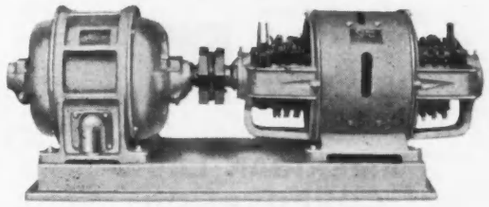

1500 ampere, 6 volt or 750 ampere, 12 volt Columbia generator driven by a General Electric induction motor. Overall length 63⅝"; width 17½"; height 21⅜"; weight 1200 lbs.

Columbia Electric Manufacturing Co.
1292 E. 53rd St. Cleveland, Ohio

Better commutators and other parts — at reasonable prices.

Make "EUREKA" your regular source of supply for commutators, and other parts such as—

Commutator Bars (forged, drawn or cast). Brush Holders. Copper Leaf and Gauze Brushes. Controller Fingers, Segments, Field Plates, etc. Switches. Non-ferrous Castings and Drop Forgings.

Dependable prompt deliveries of highest quality parts, at reasonable prices.

Let us figure with you on all or part of your requirements. Write us.

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91 Clay Street, North East, Pa.

EUREKA

WIRE MANUFACTURING MACHINES—Continued
Sleeper & Hartley, Inc., Worcester, Mass. ..... A ... S T
Terkelson Machine Co., Boston, Mass. ..... M .....
Textile Machine Works, Reading, Pa. ..... B .....
Universal Wire Machy. Co., 69 Daggett, New Haven, Conn. ..... A ..... U P
Utility Mfg. Co., Cudahy, Wis. ..... I .....
Wardwell Braiding Machine Co., Central Falls, R. I. ..... B .....
Watson Machine Co., 74 Railroad Ave., Paterson, N. J. ..... I .....
Wire Machinery Corp. of Am., New Haven, Conn. ..... M S U ..
Weir. See Housatonic Machine

WIRE POLISHING MACHINES
(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
New England Butt Co., 324 Pearl, Providence, R. I.

WIRE, Steel Flat
Steel Coating for Armored Conductor.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill
Crescent Insulated Wire & Cable Co., 319 N. Oden Ave. Trenton, N. J.
Roebling's Sons Co., John A., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE STRAIGHTENING MACHINES
Kane & Roach, Syracuse, N. Y.

Shuster Co., F. B., New Haven, Conn.

WIRE TAPING MACHINES. See Taping Machines, Wire.

WIRE VULCANIZING MACHINES. See Vulcanizers Wire Insulation.

WIRE WRAPPING MACHINES
Terkelson Machine Co., Boston, Mass.

WOOD BLOCKS. See Cabinets & Boxes, Wood.
Boxes. See Cabinets & Boxes, Wood
Cabinets. See Cabinets & Boxes, Wood
Pulleys. See Pulleys, Composition.
Woods Metal. See Radio Mountings.

WRAPPERS, Paper. See Boxes and Wrappers.
WRAPPERS, Tungsten Lamp. See Boxes and Wrappers.
WRAPPING MACHINES, WIRE. See Wire Wrapping Machines.

YARN AND THREAD; Silk, Cotton, Asbestos
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
American Asbestos Co., Norristown, Pa.
American Glanzstopf Corp., 180 Madison Ave., New York. N. Y.
Anchor Thread Co., Trenton (Grovesville), N. J
Asbestos Fibre Spinning Co., North Wales, Pa.
Columbian Rope Co., Auburn, N. Y.
Commercial Rayon & Thread Co., 19 W. 21st, New York.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Florsheim, H. A., 225 Fifth Ave., New York, N. Y.
Franklin Rayon Corp., 86 Crary, Providence, R. I.
General Electric Co., Schenectady, N. Y.

Great Lakes Yarn & Thread Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit, Mich.
Johns-Manville Corp., New York, N. Y. (Asbestos.)
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Multiple Winding Co., 77 Summer, Boston, Mass.
Rich & Co., H. S., 180 S. Water, Providence, R. I.
Ryle & Co., Wm., 381 Fourth Ave., New York, N. Y.
Silkslip. See Worcester Bleach & Dye Wks. Co.
Smith & Dove Mfg. Co., Andover, Mass. (Linen Thread.)
Worcester Bleach & Dye Wks., Worcester, Mass.

ZINC
Horse Head. See New Jersey Zinc Co.
New Jersey Zinc Co., 160 Front, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn. (Strips.)
United Metals Selling Co., 25 Broadway, New York, N. Y.

ZINCS AND COPPERS, Battery
Bunker Hill. See St. Joseph Lead Co.
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Edes Mfg. Co., Plymouth, Mass.
Extruded Metal Corp., 184 53rd, Brooklyn, N.Y. (Zinc Cups.)
Franklin. See Grasselli Chemical Co.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Illinois Zinc Co., Peru, Ill.
Lind Mfg. Co., 70 Wyckoff Ave., Brooklyn, N.Y. (Zinc Cups.)
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Co., 160 Front, New York, N. Y.
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When we mould you products, you capitalize our aggregate experience in moulding an immense variety of pieces. Simple or intricate, we make our own moulds, control each step and deliver a perfectly uniform job. Let us quote from your blueprints.

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502 Prospect Avenue *Trenton, N. J.*

From mould *to moulding*—
every step controlled

WANTED

Selling representatives for coils, transformers, magnetic and dynamic speaker units. Must be established with office. Write
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Make use of
GAGE STENCILS

Gage Stencils are corrected daily, and the names of *all* your electrical buyers are on them. Use them for reliable, complete coverage.

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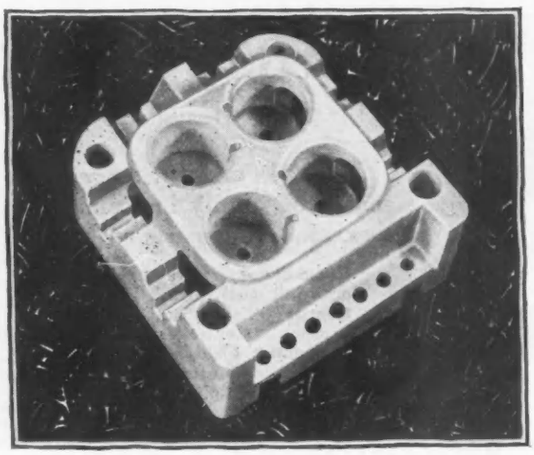
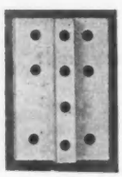


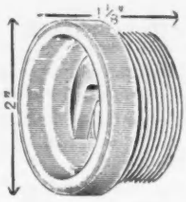
"Quality"
Special Porcelain
Refractory Tubes for Every Purpose

COLONIAL INSULATOR CO.
Akron, Ohio *Established 1894*

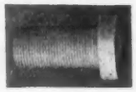
INSULATORS



made of
LAVA



ELECTRICAL appliance manufacturers have found in Lava parts the solution of their problems of insulation. Each part made to special design. The material strong in dielectric and heat resistant properties.



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Manufacturers of Heat Resistant Insulators

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Magnet Wire — All Insulations
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All Products Made to Recognized Commercial Standards including those of:
National Electric Mfrs. Assn.
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For 25 years manufacturers and suppliers to the largest and most discriminating users.

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This book tells you in a nutshell the correct grade of phosphor bronze to use in all kinds of applications

Send for it! Using precisely the correct grade of phosphor bronze makes too much of a difference to do with approximates. This book helps you locate the exact grade that will contribute most to your product.

ALL Elephant Brand Phosphor Bronzes are refined to 100% purity by seasoned experts. They know, from countless tests, what grades will exactly suit specific purposes.

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Comes in ingots, castings, rods, tubes, sheets, wire and ropes. The S Bearing Metal is unequalled in Bearing qualities and uniformity. Typical of our entire output.

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Nickel RESISTANCE Chromium WIRE

A grade for every need.

We are manufacturers exclusively of high grade resistance alloys.

Standard Nickel-Chromium "A," "C," and "D" and Standard Novar cover all ordinary resistance requirements; for high grade electric cooking and heating appliances, industrial furnaces, rheostats and controllers, and electrical testing and measuring instruments, radio rheostats, resistors, thermo-couples, etc.

We make these and other resistance alloys in wire, ribbon or strip, either bare or insulated.

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Manufacturers of

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MAGNET WIRES

Cotton, Silk, Asbestos and Enamel Covered

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Standard Thermostatic Metal

Non-Rusting Thermostatic Metal

A NEW combination of metals perfected to avoid the necessity of extra processing when contact with steam or water makes the use of other thermostatic metals impractical. Little loss of sensitivity. Made in all sizes and shapes for every application.

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in Platinum, Silver and Alloys

Interstate Products Corporation
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We Manufacture

THERAPEUTIC LAMP CARBONS

Ultra-violet Sunligh
Infra-red

All Standard Sizes

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23-25 North Jefferson Street, Chicago, Ill.

Stripping 550 pieces of wire an hour on both ends and

Saving $100 a day!

One radio manufacturer solved a wire stripping problem by installing five France strippers and increased production in this department up to 550 pieces per hour per operator.

Strips insulation sharp and clean. Leaves stranded wires twisted neatly ready for soldering or terminal connections. Takes up but little space. Inexperienced girl or boy can operate it.

You can test the France stripper in your own plant without obligation to purchase—order a France, on this basis, today. State fully your stripping details and specify the voltage and frequency of your lighting circuit.

We will ship a France immediately on receipt of your order—if it doesn't prove in one day its ability to pay for itself in a short time, return it to us—is that a fair proposition?

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CASE BROTHERS
INCORPORATED
Highland Park, Conn.

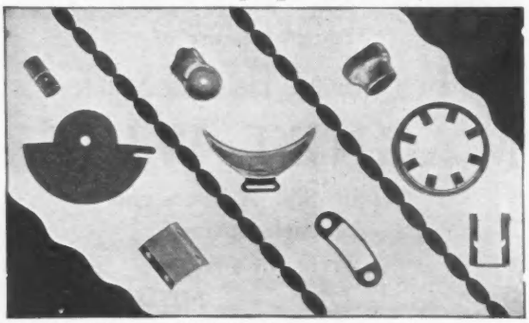
Manufacturers of

Insulating Papers and Boards

Press Boards

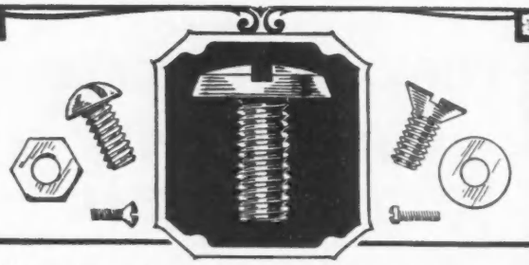
Fuller Boards

Small Metal Stampings Accurately Made



PATTON-MacGUYER CO. — Providence, R. I.

TRY US
and you will know why we are always busy on springs and screw machine parts. Quality and service our WATCHWORDS.
The Peck Spring Co.
Plainville, Conn.



All kinds of Electrical Screws carried in stock
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NEW ENGLAND SCREW CO.
DEPT. A
44 FARNSWORTH ST. BOSTON, MASS.

For Better Washers

OF BRASS, STEEL AND COPPER
Highest quality—Low prices
Write Us
MASS. MACHINE SHOP, INC.
BOSTON, MASS.

AN OVEN FOR THE BAKING OF ARMATURES AND COILS

The well-designed and properly constructed oven for baking motor armatures and coils effects important savings in maintenance costs, because:

1. Its general layout is fitted to the needs of the plant where it is located.
2. It reduces to a minimum the amount of handling and operating labor required.
3. It conserves fuel by means of properly disposed insulation, heat-proof construction and the recirculation of heated air.
4. It gives a high degree of product uniformity, due to a carefully balanced system of heating and ventilation, that subjects all units of the oven load to the same temperatures.
5. It is highly flexible and under complete control, so that baking conditions can be accurately varied to suit the needs of any type of coils or armatures being run.
6. It can be operated with complete safety, concentration of inflammable or explosive mixtures of gas in dangerous quantities being prevented.
7. It does not allow burning or embrittlement of the insulating varnish.
8. It produces a thoroughly dry film, tough enough to withstand the most severe treatment in service and developing the full dielectric strength of the varnish.
9. It bakes the coils or armatures in the shortest time consistent with the characteristics of the varnish used.
10. It delivers the baked coils or armatures all ready for assembly.

If your oven units do not meet these standards, your baking and maintenance costs are probably higher than they need be.

YOUNG BROTHERS COMPANY
6523 MACK AVENUE, DETROIT, MICHIGAN

District Sales Offices:

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Ovens For

Core and Mold Baking
Drying
Electrical Appliance Baking
Low Temperature Heat Treating
Japanning and Enameling
Adapted to All Methods of Heating

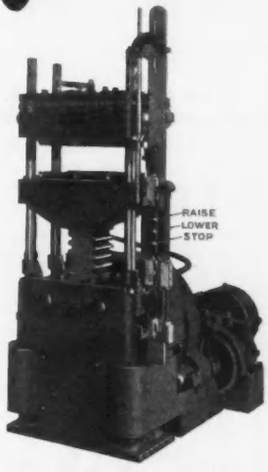
INDUSTRIAL OVENS

Young Brothers Company are prepared to investigate and make recommendations for means of increasing your oven efficiency.

You are under no obligation in accepting this service.

Why!

Some Manufacturers Now Do Their Own MOULDING



Definitely lower costs—production under one roof—freedom from delivery worries—and greater production speed are some of the incentives that have spurred many electrical manufacturers to do their own moulding by the Electro-Draulic Process. The possibilities are profitable and interesting. Manufacturers not at present moulding their own products and those seeking an exceptional means of bolstering efficiency and productiveness in their moulding departments will find our bulletin interesting.

Ask for Bulletin E-1.

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Manufacturers
Terkelsen Bldg., Boston, Mass., U. S. A.

Paper Tubing *of Black Dixie Kraft*

WE furnish this tubing in diameters of from 3/16 to 10¼ in. in any desired wall thickness and length.

Many production problems involving the factors of insulation, strength and economy have been solved through the application of these paper tubes.

Send for samples to test and, incidentally, mention the nature of your possible usage of paper tubes.

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ELECTRITE

A high grade fibre board for electrical insulation.

A material of quality possessing high tensile and dielectric strength.

Tested and approved by the Underwriters' Laboratories.

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Pure Zinc for Fuse Elements

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Eyelets Standard & Special

Large Articles Made on Multiple Plunger Press

The Platt Bros. & Co.
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Electrical Materials

TESTED FOR

Dielectric Strength
High Voltage Breakdown
Conductivity and Resistance
Chemical Composition
Mechanical Strength
Microscopic Structure
Wearing Qualities
Operating Characteristics

A Written Report to Each Client

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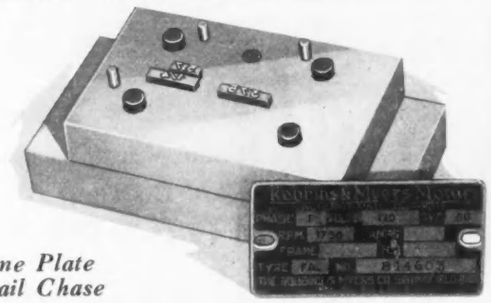
80th St. and East End Avenue, New York



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Stamp all details in your name plates with one operation. Straight, uniform stamping improves appearance and stamping is done in a fraction of time.

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for Factory, Shop and Office Ask for Catalog "C-E.M."

Angle and Sheet Steel Stools—Chairs—Desks—Bench Legs Tables—Benches—Cabinets—Trucks—Machine Tenders—Bins—Pans

Agents and Dealers in Principal Cities

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GITS BROS.

Better Oilers

287 Styles & Sizes

GITS BROS MFG. CO.
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BEAD CHAIN *for* ELECTRIC FIXTURES

Dependability

From the standpoint of quality, uniformity, and prompt delivery, dependability has made Bead Chain the standard of the industry.

THE BEAD CHAIN MANUFACTURING CO.
BRIDGEPORT CONNECTICUT

Albert Lorsch & Co., Inc., Sales Agents
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Can you afford to experiment with soldering paste?

IN your soldering operations a *proven* soldering paste is the *one* thing upon which a soldered joint depends. An uninterrupted schedule of production results from the use of a quick-acting and dependable paste.

HIGHLAND Soldering Paste has been the choice of electrical manufacturers for many years. Put up in containers of handy size. Price lists on request.

Send for a sample and put it to any test

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"Everything in Insulation"

Compounds, Waxes and Paints
Varnishes and Varnished Materials
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Mitchell-Rand Mfg. Co., 19 Vesey St., N. Y.

"Candy's Faultless"

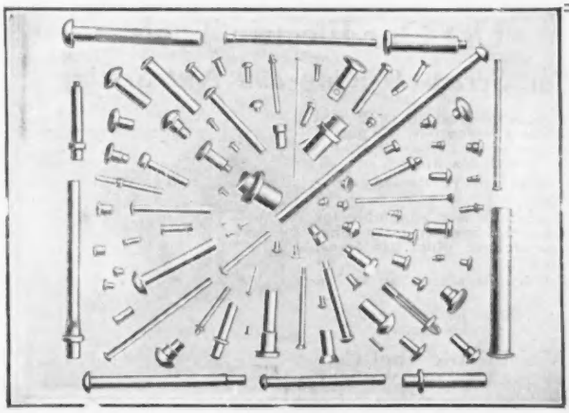
(True to name)

WAXES INSULATING MATERIALS

for Rubber Covered and Weatherproof Wire, Coils, Condensers, Conduit, Wet and Dry Batteries, Wiring Devices, Sockets, Switchboards, etc. MATERIALS TO YOUR OWN SPECIFICATIONS OUR SPECIALTY. Compounds for Radio Parts.

35 Years' Experience in Compounding

CANDY & COMPANY, Inc.
35th and Maplewood Ave., Chicago, Ill.



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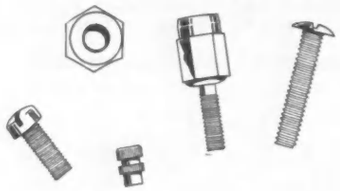
MACHINE SCREWS
MACHINE SCREW NUTS
SPECIAL STUDS
SPECIAL SCREWS

COMMUNICATE WITH
THE HOUSE OF SERVICE

THE PROGRESSIVE MANUFACTURING CO.
TORRINGTON, CONN.

We please those discriminating manufacturers who not only demand quality but service as well. Business goes where it is invited and remains where it is well treated. The illustration reveals a few only of the possibilities that are developed by the cold heading process.

Much a-do
about little things



We specialize in making little things superlatively well. Probably as much care is spent, in proportion, on the making of these little screw-machine necessities as on the manufacture of a massive dynamo.

The amount of your order, please remember, by no means regulates the amount of attention it receives. Our plant is big enough to handle little orders as well as volume.

THE
BLAKE & JOHNSON CO.
1497 Thomaston Ave.
Waterville, Conn.
SINCE 1849

Information Wanted

We have been asked for the names and addresses of manufacturers of the items listed below.

Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of ELECTRICAL MANUFACTURING, 461 Eighth Ave., New York City.

"Burrows" Therapeutic Lamp
"Defiance" Cigarette Lighter
"Flint" Waffle Iron
"Hillcrest" Line of Lighting Fixtures
"L. R. Co." Receptacles
"Pioneer" House Pump
"Williams" Commutator Dressing
"Medsco Beauty" Iron
"Thermodyne" Therapeutic Lamp
"Aspinall" Soldering Fluid
"Seco" Plug Fuses
"Indulet" Fittings

Electromatic Traffic Dispatch asked for in our November issue is manufactured by Automatic Signal Corp., 205 Church, New Haven, Conn.

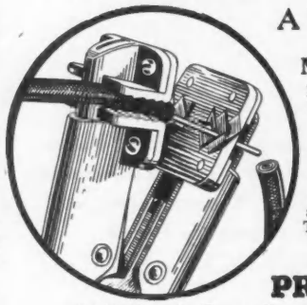
Coil Wire SPRINGS

For all electrical and mechanical manufacturing purposes. All specifications as to quantity and quality are accurately met. Our prices are right and delivery prompt.

Write for Catalog

ADVANCE SPRING & WIRE COMPANY
Carroll Ave. and Wood St.
Chicago, Illinois

E-Z WIRE STRIPPER



A HANDY TOOL
for all
MANUFACTURERS

Here is a tool that will save you time and money, speed up production and lower your costs.

This inexpensive tool strips wire of 10 to 20 gauge 20 times faster than usual methods. Give it a trial on a money back guarantee. Thousands in use.

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2311 South State St., Chicago, U. S. A.

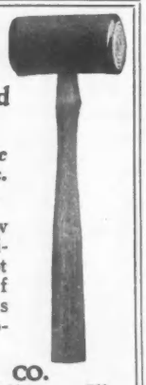
Chicago Rawhide

Mallets and Rawhide-Faced Hammers

Used extensively in electric motor assembly and repair work.

Saves Battered-Up Motor Parts

Will transmit an effective blow without damage to the most delicate surface. The blow is not more destructive to the tool itself than to the object to which it is applied—therefore, doubly economical.



THE CHICAGO RAWHIDE MFG. CO.
1287 Elston Ave., Chicago, Ill.

Use Our Electric Tools

For Screw Driving and Nut Setting

in your production work and double your output. We manufacture several types—Portable and Bench Machines.

Send us your particular proposition.

These tools are adaptable for Radio and Speaker assembling, also electric plugs, switches, etc.

Will handle screws up to No. 10.

Ask us for prices and circular matter.

BENCH TOOL WITH PEDAL

Vim Electric Tool Co.
149 Broadway, New York City

COILS

Electro Magnet
Transformer
Inductance
Resistance
Ignition
Medical
Meter
Choke

WE make any type coil under the classifications of paper section, layer-wound and cotton interwoven. The many years we have devoted to the solution of coil problems have placed us in an advantageous position in this industry.

Acme
Products Co.
Boston, Mass.
Electro Magnet for Fire Alarm Systems

The *right* Spring costs no more

DEPENDABILITY of springs as a part of your product is of more importance to you than initial cost. All things considered, when a spring is essential to the operation of any device the best is the cheapest, regardless of first cost.

GIBSON-SPRINGS

COMPRESSION EXTENSION
TORSION FLAT
ANY MATERIAL OR QUANTITY
ANY STYLE OR SIZE
ALSO LIGHT STAMPINGS

WM. D. GIBSON CO.
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CHICAGO
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M.&W.Co 1876

LACQUERS ENAMELS

Crystal Enamel the 1930 Finish

For 1930 many Manufacturers are adopting the M & W Crystal Finish on Metal Parts for the following reasons:—

1—It is a *One Coat Finish.*
2—It *Hides Imperfections* in metal stampings.
3—It *Air Dries* at *Room* temperature.
4—It produces a *Beautiful Crystalline Finish.*
5—It is available in *Solid Colors.*
6—It is the *Ideal Production Finish.*

It is particularly well adapted for Steel Stampings and will appeal not only to your Production Man, but to your Sales Department as well.

Your inquiry is invited.

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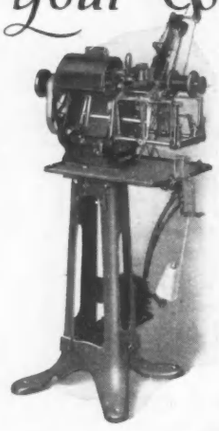
Los Angeles Office and Warehouse: 1314 Venice Blvd.

Your Coil Problem Solved!



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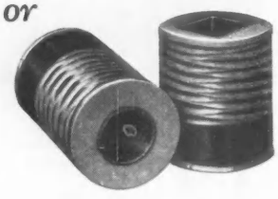

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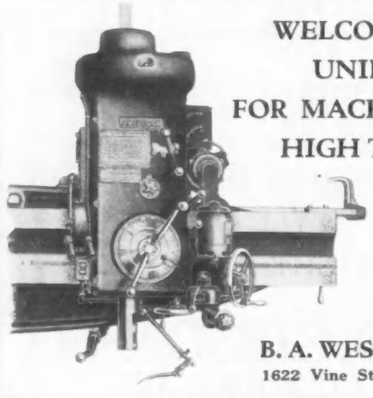

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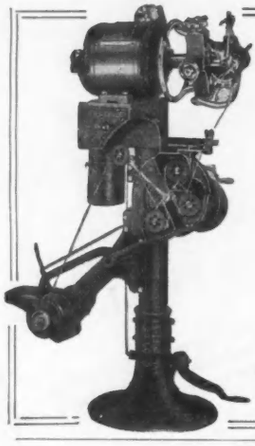

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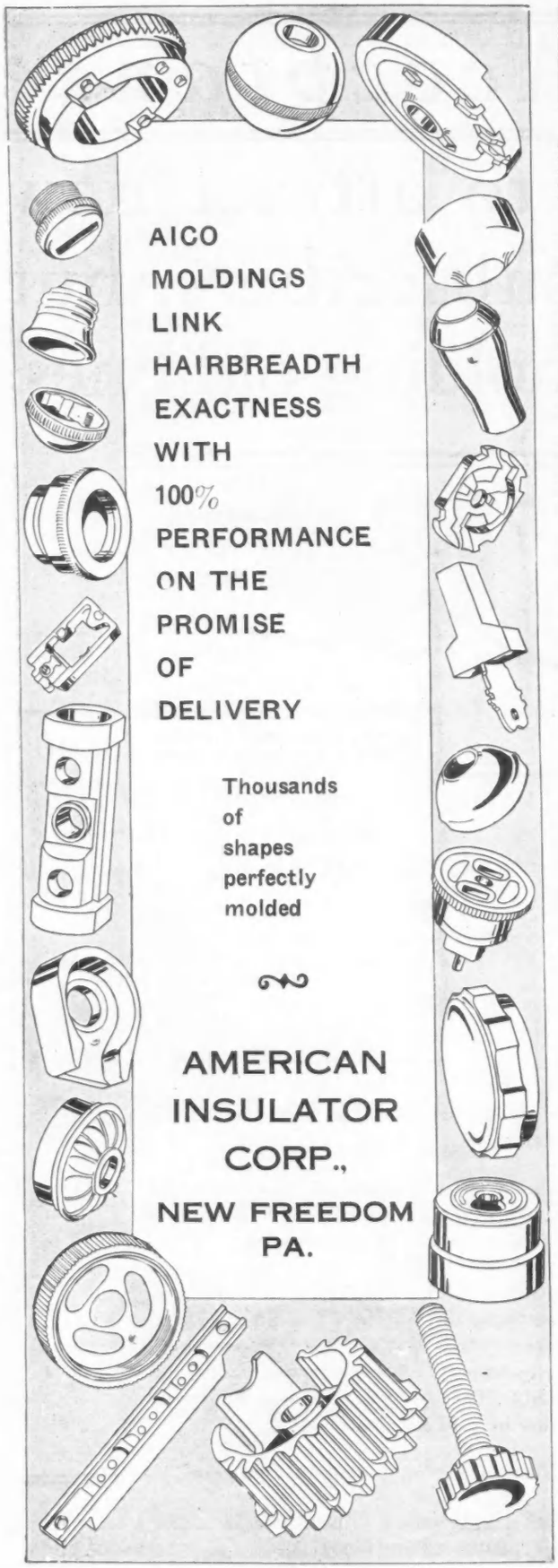

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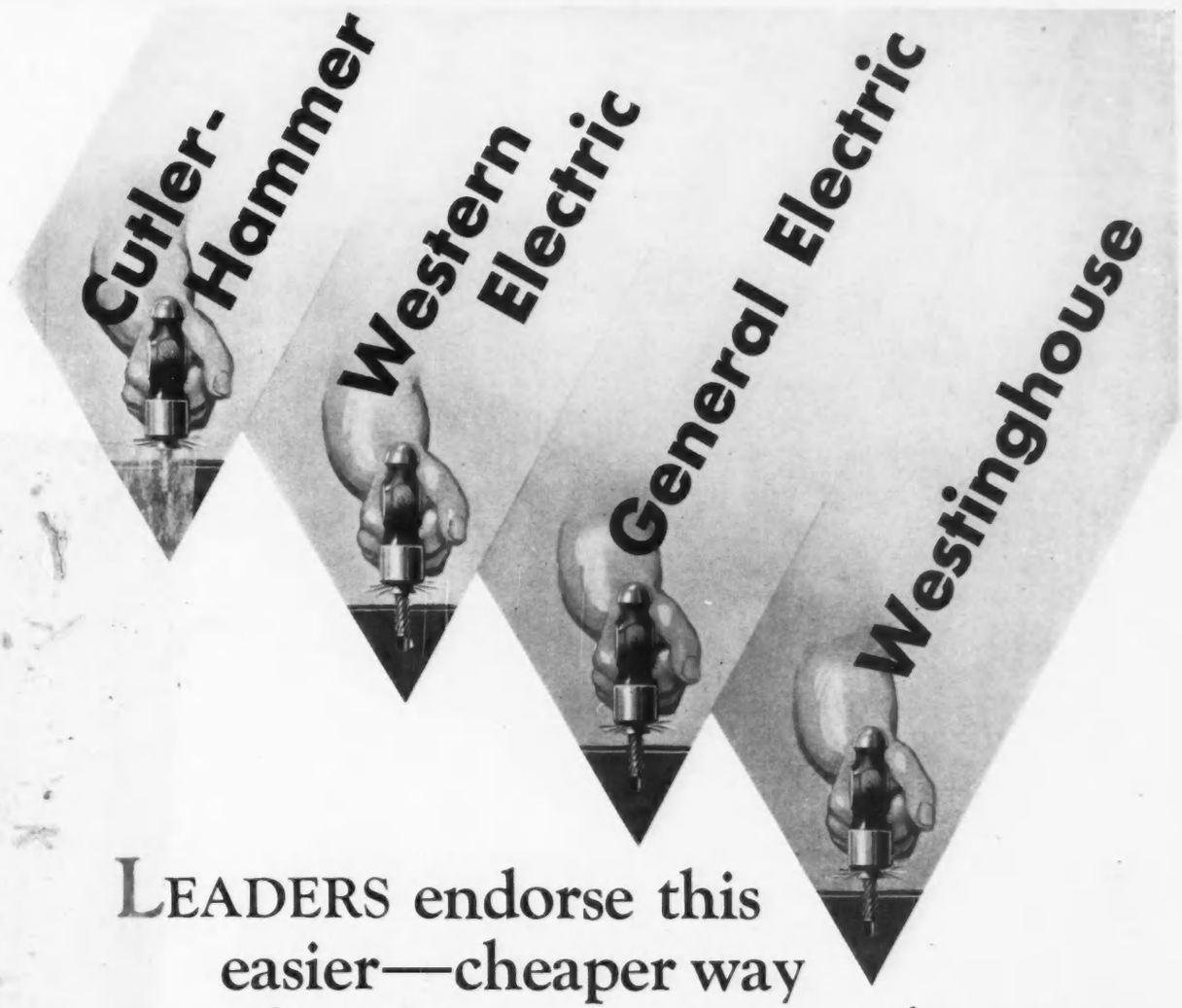

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